THE ELECTRICAL WORLD
The Weekly Review of Current Progress in Electricity and its Practical Applications

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THERE seems to be a fear in some quarters that in appointing one of the three commissioners to bury the wires, Mayor Grace is likely to select a man who has already committed himself against underground wires as undesirable and even impracticable. This would not be the best way to carry out the law in either its letter or its spirit. But probably Mayor Grace is misrepresented.

FEW portions of our contents to day are more interesting than the discussion we print in this issue, as part of the recent proceedings of the American Institute of Electrical Engineers, as to the condition of the Patent Office and the operation of the patent law. Both subjects concern a great many people. Incidental to the main discussion is a very suggestive little argument as to what constitutes real genius in invention.

A BILL has been before the Massachusetts Legislature, the purpose of which is to secure greater care in the transmission of telegraph messages. The last report to hand is that the bill will be lost, as it deserves to be. Cases in which damage has resulted from delay or mistakes can always be carried into the courts. The best remedy for "negligence" is to pay good wages to the operators, and then the most faithful service of intelligent men will be obtained; but that reform will not be greatly advanced by the action of Legislatures striking blindly at "monopolies."

THE French transport "Isere" has at last arrived, bearing the Bartholdi Statue of Liberty. Now, as Miss Emma Lazarus puts it in her fine sonnet,

> "Here at our sea-washed sunset gates shall stand
> A mighty woman, with a torch whose flame
> Is the imprisoned lightning."

The *World* fund for the Pedestal has now reached full $75,000, and we are glad to know that the electrical community is doing its share of the good work. We publish to-day another list of contributors, and it will be seen that the money has come in from all parts of the country. This is as it should be, the gift being sent from one nation to another.

IT is nothing short of cruel that people should have to watch during the hot weather all the changes that are going on in the affairs of the Postal and Bankers & Merchants' telegraph companies. Order will ultimately be evolved out of the chaos, but not just now. With regard to the reports of consolidation between these two companies, it is said that no step of that character can be taken without an order of the Supreme Court, ratified by the bondholders and stockholders of both corporations. A pooling agreement covering certain points heretofore subject to competition has been effected for the purpose of reducing expenses; but even that is contested in some States by parties interested in the Bankers & Merchants' Company.

THE Underground Bill has become a law, with all the defects and loopholes to which we called attention, on the 6th inst. The interest now centres in the appointment of the three Commissioners of Electrical Sub-Ways in each city, in whose hands large powers are placed. What Senator Daly thinks on the subject is quoted elsewhere. The views of some other parties were ventilated the other day when a prominent member of the Greenback Labor party called on Mayor Low, of Brooklyn, and wanted something done under the first underground bill, as it "would give employment to a great many men to put the wires down between now and the first of November." This is genuine demagogism, and we are glad to know that this effort to crowd the Mayor will not be attended with any results.

NEW applications of electricity are now so common to electrical readers that their announcement causes but a passing notice. We note, however, a new departure which deserves especial attention not only on account of its practical importance, but for the additional reason that the neglected static electrical machine now comes forward to share some of the honors and profits of the young and vigorous dynamo. The application, briefly stated, consists in causing electric sparks to pass through dust or fumes, by which the latter immediately condense or form into flakes and are quickly deposited. This has been successfully applied in an English lead-smelting establishment to the condensation of the fumes, and there can be no doubt that its uses will be widely extended, not only in metallurgical operations, but in others where dust or fumes are to be rapidly collected. Flouring mills, however, would in all probability do well to give the application a wide berth. This excellent method opens up a new field for the static machines which have so long been relegated to the laboratory, and may lead to their improvement. In this connection we may remark that improvement has been very slow. There have been granted up to date in this country less than twenty patents on static machines, the average being about one a year.

FEW large engineering works are now carried on without the help of the electric light. Mr. J. N. Shoolbred, B. A., has lately given the English Society of Telegraph Engineers and Electricians a full description of the manner in which the gigantic structure of the Forth Bridge works has been operated since 1883, and the extent to which electric lighting has been used. Both arc and incandescent lamps have been employed, running sometimes, he states, as long as 700 hours at a stretch. Some of the lights are a mile and a half from the dynamos, and many of them are employed in the works under water, and are shifted from place to place. He notes that the Swan lamps used had an average life, during the first half year of the work, of 404 hours, but that the rate rose to 700 hours in the next year, and that the average now is 1,200 hours. The India-rubber and gutta-percha insulation was subjected to a severe test, as the air is constantly filled with salt spray. It was found that under these conditions the India rubber soon became useless, and that solid gutta percha is preferable. Naked copper wires are frequently run, and the corrosion is found to be very slight. In the discussion upon this paper and another, as to the encouraging results of electric lighting on board H. M. S. "Colossus," already described by us, the fact came out that a Peninsular and Oriental steamer had recently made a voyage from England to New Zealand and back, and had had only one breakage of an incandescent lamp. The saving per year, over oil, on the "Colossus" was about $10,000. All these are good arguments for the electric light.

IT is still much too early to foresee the result of the work done last week at the Telephone Conference in Boston, but that the general effects will ultimately be beneficial may safely be prophesied. Should there be secured a greater uniformity of practice, that in itself would be a sufficient return for all the time and expense devoted to the matter, but it happens that while in no way exposing its interests to detriment, the American Bell Telephone Company has given its licensees a good opportunity to earn more money and to cultivate more amicable relations with the public. The influences of this kind are already making themselves apparent in the higher quotations of telephone stock, and we see no reason why prices should stop at their present limit. The latest statistics published by the company, and made accessible at the Conference, show a remarkable vitality and growth in the business. On January, 1885, there were no fewer than 1,252 offices in the exchange systems. The number of circuits has increased from 74,484 on Jan. 1, 1883, to 107,440; the number of miles of wire from 68,571 to 101,734; the number of employés from 3,716 to 5,168, and the number of subscribers from 97,728 to 134,847. These are striking figures when it is borne in mind that the increase has taken place in spite of an almost unparalleled depression still making itself felt throughout the country.

ON the 12th inst. the chief of the "electrical department" of the city government of Philadelphia sent a communication to all the telegraph, telephone, electric light and railroad companies in that sedate town, notifying them to comply with an act of City Councils which states that all wires in the city proper must be placed under ground or removed by Jan. 1, 1886. Mr. Walker is, we believe, a good electrician, and therefore knows that such an order is a roaring farce. The city could not even get its own wires under ground in the time mentioned, not to speak of the thousands of miles of wire operated by the various telegraph, telephone, electric light and railroad companies. To cut the wires would be municipal suicide, as Chicago recently demonstrated, since that would preclude any possibility of forwarding a fire alarm or a call for an ambulance; it would paralyze the police system just inaugurated there, and cause a riot among the brokers and merchants thus cut off from the outer mercantile world. The telegraph and telephone companies can as well afford to let Philadelphia alone and go all around, outside of her Chinese wall, as she can to deliberately cut herself off from communication with the world at large. The same remarks may apply also to this city, Gov. Hill having signed the bill requiring all wires in this city and Brooklyn to be put under ground before the first of next November. In both cases the date is set close enough, in view of the physical difficulties in the way of carrying out such preposterous laws, to furnish a sufficient excuse to defeat the object. Of course, the law appoints a commission to see its edict carried into effect, but it may as well appoint a commission to see that the traditional camel gets through the eye of the infinitesimal needle.

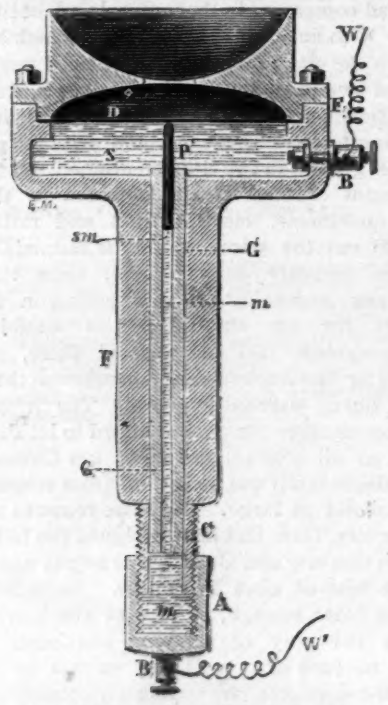
SCIENCE, in its rapid march, is steadily showing us that poetry is not all a dream. The girdle of Puck, "round about the earth in forty minutes," which Shakespeare wrote of 300 years ago, is now practically an accomplished fact, and the beautiful allegory of the cannon shot that was "heard around the world" lost its poetry when the telephonists at Malta heard the bombardment of Alexandria, a thousand miles distant. These facts are emphasized by an article in our esteemed contemporary, the London *Spectator*, which, discussing the discovery of the utility of the gelatine plate in photography, says that the apparent impossibility of *seeing* what is going on in a planet may disappear, just as the possibility of *hearing* beyond a certain distance has disappeared. "Our hearing," says the *Spectator*, "has not increased since the days of the Chaldæan; but how he would have smiled if told that he could hear from the tower of Belus a whisper uttered by King Cheops from his pyramid, and be certain of the voice. Yet there are Americans interested in telephones who would contract to make that whisper possible, and it is nearly certain that within ten years the Queen at Windsor will be able to talk to the President at Washington, or the Viceroy at Simla, without difficulty or loss in their power of recognizing her own special voice. It is perfectly conceivable that glass may be superseded for magnifiers by some clearer substance, and some huge plate or other may be sensitized beyond all present experience, till we can 'see,' if not objects, electric lights in Mars, and from that to heliographic communication with Mars, though a vast step, involving enormous assumptions, is not strictly 'impossible.' It would not be so much more difficult, granting the man on Mars, as well as the man on Terra, to be aware of what was purposed, than for an Englishman to make audible signs through a telephone to a Chinaman in Pekin."

A New Mercury Telephone.

Several mercury telephones have already been invented, both in this country and abroad, but new forms are constantly appearing. It will be remembered that the late M. Breguet invented a telephone based on the discovery of M. Lippmann, that a column of mercury and dilute sulphuric acid, when traversed by an electric current, is subjected to influences which tend to displace the mercury. M. Lippmann has applied this discovery in the construction of his capillary electrometer.

The latest application is found in the telephone of Mr. Chas. Lever, of Bowdon, England, of which the accompanying illustration, from *La Lumière Electrique*, is a sectional view. It consists of a narrow glass tube *G*, the lower end of which is fixed to a small metal cylinder provided with screw thread and a metallic cap *A*, having a binding-post *B'*. The mercury *m m* is poured into the tube so as to fill the hollow part of the cap *A* and the tube *G* up to within a short distance of its upper or open end. The level of the mercury in the tube can be regulated by screwing the cap *A* in one direction or another. A light piston, preferably a rod of aluminium *P*, floats on the column of mercury *s m*, and fits exactly the diameter of the tube. The centre of the thin iron diaphragm *D*, held by the metallic flange of the mouthpiece *E*, touches the top of the floating rod. The circuit is completed by the wire *W* and terminal *B* through the diaphragm *D*, the piston *P*, mercury *m*, the terminal *B'* and the wire *W'*.

The space *S* between the diaphragm and the upper part of the tube *G* is filled with dilute sulphuric acid. The piston *P* is regulated by means of the screw of the cap, so as to touch lightly the meniscus of the mercury surface *s m*, without entering the mercury. In order to facilitate the regulation, the box *F* of the telephone ought preferably to be made of glass or some other transparent material.



NEW MERCURY TELEPHONE.

In traversing the column of mercury and the diluted electrolyte, the line current gives rise to changes in the tension of the surface of mercury at *sm*. This causes the piston *P* to rise and fall and to vibrate the diaphragm *D*.

Mr. Lever proposes to employ this apparatus both as a receiver and transmitter. He has, however, also devised a transmitter of similar construction, with the exception that no electrolyte is employed, and that the piston *P* is of some other metal than aluminium. The vibrations of the diaphragm cause the piston to dip into the mercury more or less, thus causing variations of the current in the primary of the induction coil, the secondary of which is connected to the line.

Mercury.

To the Editor of The Electrical World:

SIR: Will you please inform me through the columns of THE ELECTRICAL WORLD, 1. If mercury is ever found in a pure state? 2. When found in cinnabar what is the process of separating the mercury and sulphur? 3. Is mining for mercury unhealthy work? 4. If so, what are the results? L. B. FRENCH.

WAKEFIELD, Mass.

ANSWER.—1. A considerable quantity is found in the metallic state, either collected in cavities or disseminated in globules throughout its ore, cinnabar, the latter being a chemical compound of sulphur and mercury.

2. The ore is heated in a furnace. The mercury turns into a vapor at a moderately high temperature, and passing into a cool chamber, is condensed to the metallic state.

3. The mercury mines at Idria, in Austria, were formerly worked by state prisoners and criminals on account of the unhealthy nature of the occupation. It is generally considered an unhealthy occupation for the *laborers* employed.

4. Taken continuously, it produces salivation, ulcers of the mucous membrane of the mouth and paralysis.

The Underground Wire Law.

Senator Daly's underground wire bill, for New York and Brooklyn, of which we gave an exhaustive criticism in our issue of June 6, has become a law by receiving the signature of Governor Hill. Senator Daly says:

"Some of the companies may still seek to get an injunction against the enforcement of the law, but I feel confident now that they will not succeed. Every reasonable ground for opposition has been taken away, and I don't think any judge of competent jurisdiction will interfere in the matter after it has been demonstrated by these two bills, the result of a public discussion that has lasted four years, that it is the settled policy of the State to have electric wires in New York and Brooklyn placed beneath the surface of the ground. Some of the companies, I am told, already appreciate the inevitable, and are willing to do the best thing possible for themselves by quietly accepting the position; but others, who object to the temporary expense, still entertain hopes of a successful opposition. Everything now depends on the force and efficiency of our local authorities. If I was Mayor of New York and had colleagues who would act with me for the interests of the city, I would guarantee the enforcement of the law, and that all wires that it is practicable to place there would be under ground by Nov. 1. The duty of the commission is to see that some arrangement is adopted by which, instead of each company laying a separate tube for its wires, all the wires shall be operated, as far as practicable, in one or two tubes, and each company shall bear its proper proportion of the expense. If the companies choose to submit an available plan for accomplishing this themselves, the commission will adopt it. If they do not, then the commissioners will frame their own plan, and the companies will have no choice but to follow it. What we want to do is to establish it as the deliberate policy of the State that hereafter, in all our large cities, electric wires shall be placed under ground, as far as practicable. The scientific solution of underground telegraphy has been made, and the evidence taken before our committee left no doubt of the scientific points at issue. All that remains now is to solve the practical question, and that this law is intended to accomplish. Of course, to comply with its provisions will necessitate a temporary expense to the companies, but I feel confident that eventually they will more than recover the outlay by the saving which will result in the item of repairs alone. The Western Union Company, after the great storm of the winter of 1881, paid over $100,000 for repairs to their poles and wires in this city alone, and a great deal more for repairs outside of New York. All this would have been saved had the wires been under ground. I expect Mayor Grace and his colleagues and Mayor Low to appoint commissioners in whom the public will have absolute confidence, and who are thoroughly qualified to perform the duties imposed on them. These commissioners can within the specified time have the wires under ground, and then New York will stand some chance of becoming a beautiful city as well as a commercial metropolis."

Western Union Figures.

The Western Union Telegraph Company's statement for the quarter ended June 8, with the net revenue estimated on nearly complete returns for April and partial returns for May, is:

June estimate	$1,400,000
Interest and sinking fund	143,768
Balance	1,256,232
Dividend of 1½ per cent.	1,199,841
Surplus	56,391
Surplus, April 1	4,246,943
Total surplus, July 1	4,303,334

The company will pay a dividend of 1½ per cent. The books close June 20 and reopen July 2. The actual figures of Western Union report for the quarter ended March 31, 1885, show that the net revenues were $1,358,876, and the surplus, after paying interest and dividend, was $15,276 for the quarter. The company present a memorandum comparing the holdings of the stock as follows: Sept. 20, 1881, shares in brokers' names, 391,054; June 10, 1885, 102,044 shares, a decrease of 28 per cent.; in investors' hands, Sept. 20, 1881, 408,946 shares, against 697,956 shares June 10, 1885, an increase of 289,460 shares. The number of stockholders, Sept. 20, 1881, was 1,701, against 4,726 June 10, 1885, an increase of 3,025.

The National Telegram Company.

The management of the associations for the collection and distribution of news is rapidly becoming monopolized by ex-telegraphers, who, on account of their practical knowledge of the wire systems, are invaluable in connection with the service. The Associated Press has been greatly benefited by the changes effected in its methods since its employment of telegraph men, and the remarkable success of the United Press since its organization proves beyond doubt that telegraphers rather than journalists, or we should say those who can combine the ability of both, are best fitted to carry on this work.

We notice with pleasure the success of the National Telegram Company of this city, an organization which has been formed by two well-known telegraphers for the purpose of supplying base-ball scores, sporting intelligence of all descriptions, reports of sermons, or any out-of-the-way thing the regular press associations cannot include as a part of their constantly increasing budgets. The association is not an opposition to the Associated Press or the United Press, but, on the contrary, seeks to supplement the service of both and work in harmony with them. The growing interest in base-ball, for instance, requires that the accounts of matches played should contain more accurate information and fuller details than are now furnished are the regular way. It is in a field of this sort the new association is trying to make headway.

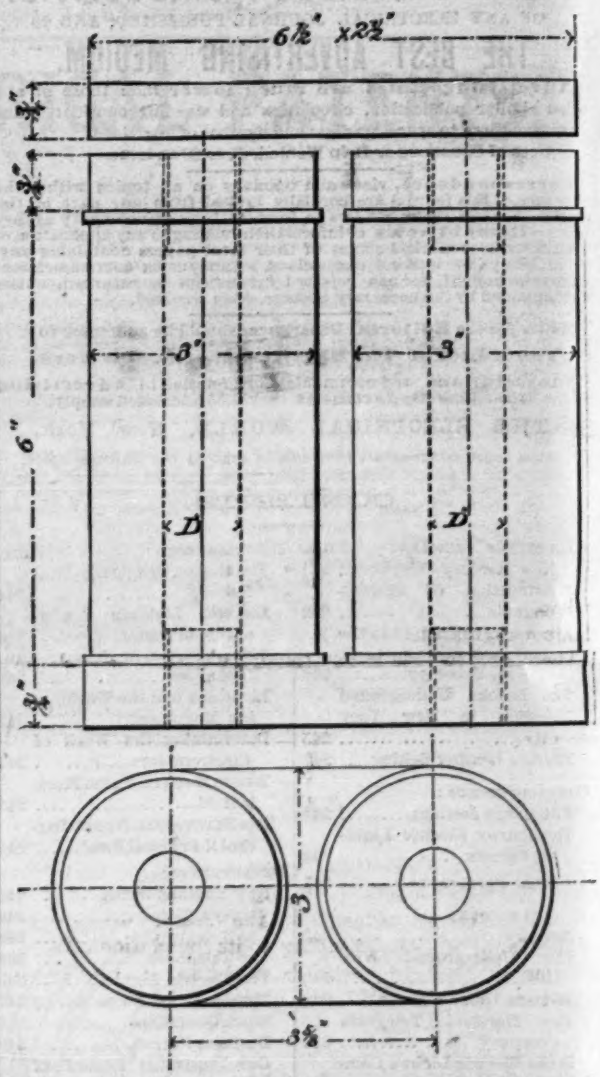
Another specialty is the reporting of the sermons of the most noted New York and Brooklyn pastors. Mr. Charles H. Bogle is the president and organizer of the new company, which began its operations May 1. Until recently he was with the Associated Press at Providence, R. I., but has now come to New York to remain.

The treasurer and general manager is Mr. W. C. Pearse, formerly of 195 Broadway and until recently manager of the United Press at Philadelphia. We wish them success in their new venture.

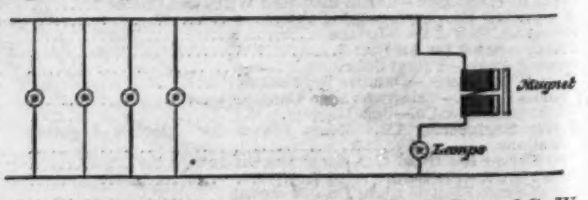
Construction of Electro-Magnets.

To the Editor of The Electrical World:

SIR: I wish to make an electro-magnet to attract an armature at a distance of $\frac{1}{16}$ of an inch. The external dimensions that I propose to give the magnet are shown in the accompanying sketch:



The current to be used is the same that passes through one of Edison's 16 candle-power incandescent lamps, the magnet being in series with the lamp, thus:



I propose to wind the magnet with No. 16 B. and S. W. G. copper wire:

What I want to know is:

1. What diameter of iron core will give the most powerful magnet?

2. Could I get better results by using any other size of wire and what size would be the best?

3 What will be the attractive power of the magnet in question?

By answering these questions and by referring me to any record of practical tests with electro-magnets that would give me an idea of their power, you will greatly oblige E. A.

NEW YORK.

ANSWER.—1. One-third the diameter of the magnet, *i. e.*, 1 inch.

2. You have chosen the right size approximately. If any finer the results would be better, but the heat would be objectionable should the current from any cause become too great.

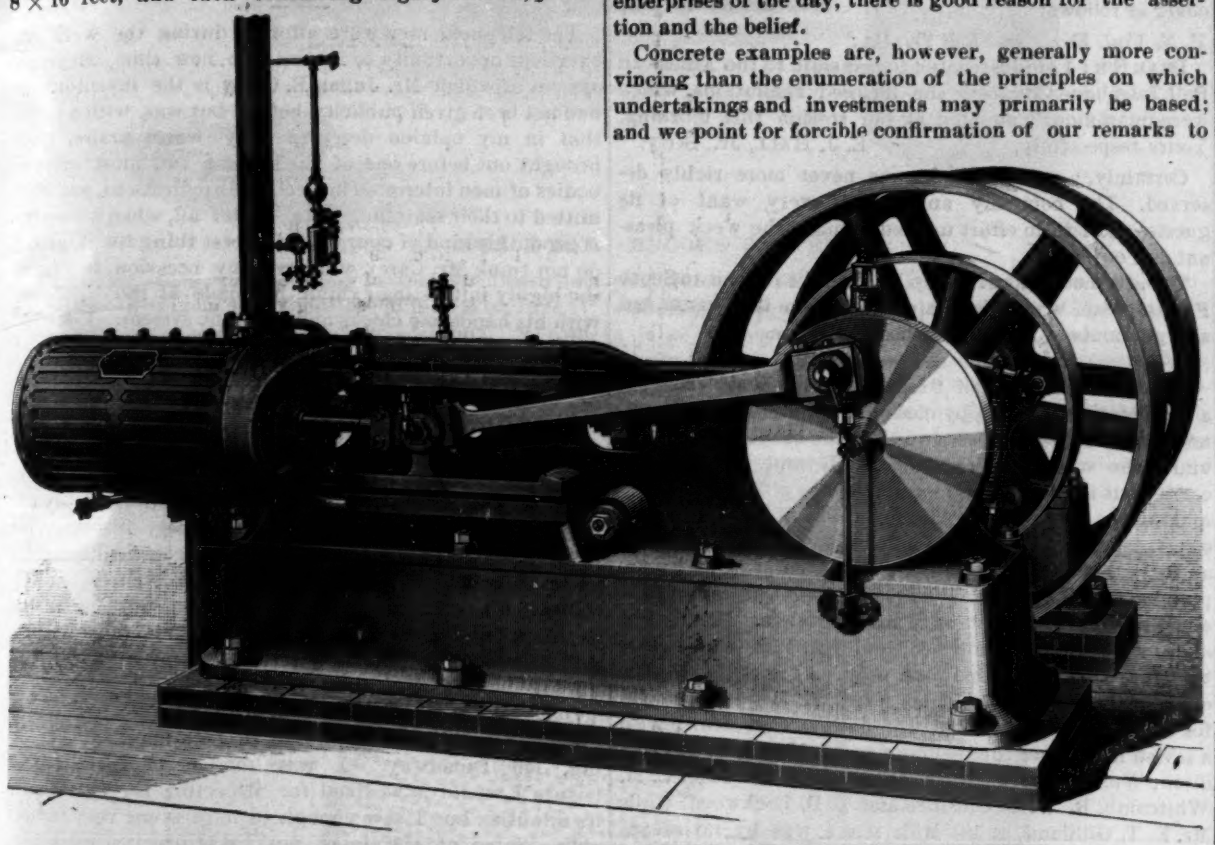
3. It cannot be calculated accurately, but it will be sufficient for your purpose.

4. See Count Du Moncel's "Electro-Magnets and their Construction."

The Buckeye Engines in the Municipal Electric Light Station, Brooklyn.

One of the best equipped of the stations which have come under our notice is that of the Municipal Electric Light Company of Brooklyn. No expense has been spared to make this installation of the highest economy and efficiency in operation, the company having evidently set out with the good proposition to clear profits by keeping down expenses, instead of charging high rates.

The system operated is that of the Thomson-Houston, and the building is of brick, 60 × 100 feet, substantially built. In the basement in front at one side are three boilers, each 8 × 16 feet, and each containing eighty-four 3½-inch



FRONT VIEW BUCKEYE SELF-CONTAINED HIGH SPEED ENGINE.

tubes. Here are also situated the accessory pumps of the Worthington type, and the feed water heater. The chimney is 100 feet high and is provided with an improved damper regulator.

These are four dynamos ranged along one side of the large dynamo-room, which is 63 × 60 feet and 17 feet high. Their aggregate capacity is 400 lights, but the ultimate capacity of the plant and building is 1,000 lights.

The motive power for these dynamos is derived from five Buckeye automatic cut-off engines, to each of which two dynamos are coupled. The engines shown in front and rear views in the accompanying illustrations, rest upon a truly massive foundation of brick, extending under the whole length of the engine-room floor, and they are still further strengthened by the specially designed bed of the Tangye pattern, bedding to its foundation along its full length. The governor is contained in a governor wheel and is a prominent type of this form, which is finding such favor over the fly-ball type of governor.

The main valve is driven by a fixed eccentric, thus relieving the governor of the duty of its actuation. The point of cut-off is varied by a separate eccentric actuated by the governor, and the cut-off valve rides within the main valve. By a very ingenious but simple arrangement of the parts, the motion of the cut-off valve upon the main valve is reduced to a very small amount, and as a result the duty of the governor is considerably reduced, and its steadiness and sensitiveness correspondingly increased.

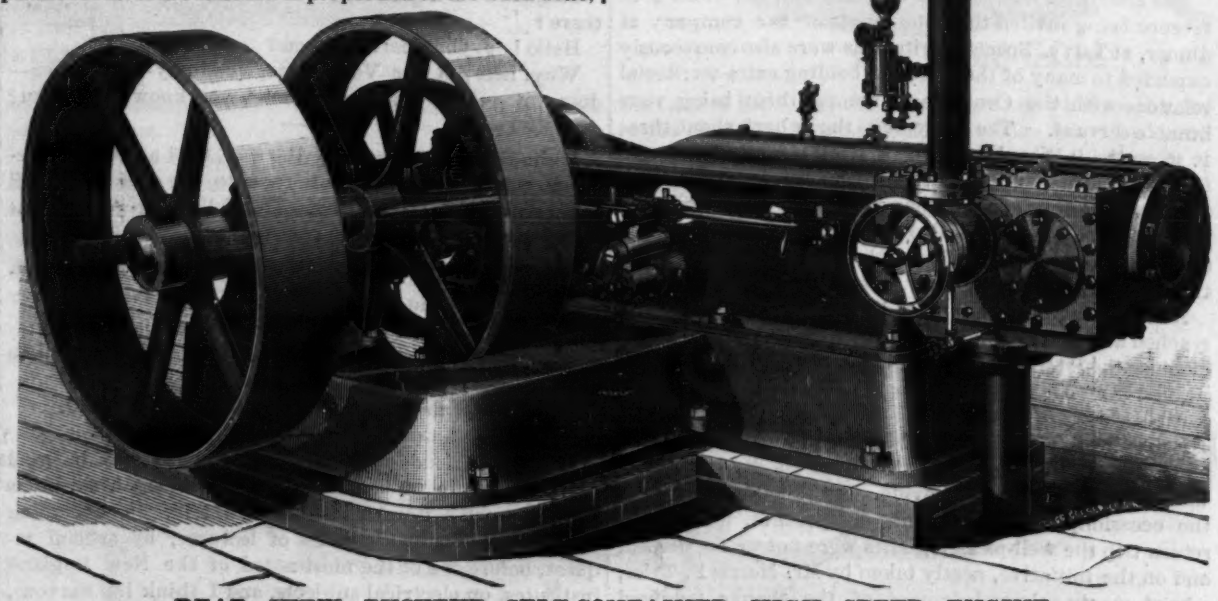
These engines give a remarkably handsome appearance to the dynamo room, and from the nature of their mounting, there is no vibration perceptible, notwithstanding the fact of their running at 285 revolutions per minute.

Is the Electric Light a Commercial Success?

There are still some people who think that, because electric light stocks were ridiculously watered and inflated a few years ago, and that because considerable sums of money were then sunk, there is really no profit in or hope for the electric light of to-day. Any idea further from the truth it would be difficult to find, and the same absurd logic might just as well be brought to bear against the telegraph, the telephone, the railway, steam navigation, or any other modern convenience in the introduction of which vast sums were invested, but from which to-day enormous revenues are derived.

The reasons why electric lighting should and does pay are patent to any one who will take the trouble to note the signs and tendencies of the times. People are becoming familiarized with its good points—its lack of heat, smell, or noxious products; its great safety, its cheerfulness and healthfulness; its peculiar applicability to novel emergencies: its moderate cost and the simplicity of the generative plant. These are weighty considerations with a public growing rapidly in wealth, in æsthetic sensibilities, and in a knowledge of hygienic requirements. Moreover, the methods for obtaining the light have been strikingly improved, and the economies effected at every stage are nothing short of marvelous. Boilers and engines are built with a view to their use with dynamos; beltings and shaftings of special make are devised; lamps and carbons are much cheaper and better than they were; the dynamos deliver more and more current to the light circuit; and the engineers in charge have achieved a mastery of the many subordinate details in which very often will lie wholly the difference between profit and loss. Hence, when we say that we regard electric lighting as one of the most promising and solid enterprises of the day, there is good reason for the assertion and the belief.

Concrete examples are, however, generally more convincing than the enumeration of the principles on which undertakings and investments may primarily be based; and we point for forcible confirmation of our remarks to a very interesting series of letters sent in to the American Electric Manufacturing Company, by officers of several of the sub-companies using its system, scattered through New England and operated solely by local management. Thus Mr. F. A. Sawyer, Treasurer of the Consolidated Electric Light Company, Portland, Me., says: "During our first fiscal year, which we began with no lights at all, and at the end of which we had less than one hundred and fifty, we netted a profit of nearly $5,000, as shown by our books. Since then we have increased to two hundred and fifty lights, and expect soon to have three hundred; we are rid of competition, which was expensive as well as annoying, the cost of carbons and other supplies has greatly decreased, our expenses for labor are lessened in proportion to the work done,



REAR VIEW BUCKEYE SELF-CONTAINED HIGH SPEED ENGINE.

and not only is our business larger, but the ratio of net earnings to gross receipts is greatly increased. Of our total capital of $250,000, one-fifth, or $50,000, remains unissued. On the outstanding capital, $200,000, we are to-day earning, net, over five per cent. annually. We are now arranging to sell the five thousand shares in our treasury, and with the proceeds, $50,000, we shall increase our arc plant to three hundred lights, and put in an Edison incandescent plant also. With this increase we are confident of earning at least eight per cent. on our entire authorized capital." Mr. G. E. Clifford, treasurer of the Wachusett Electric Light Company, Fitchburg, Mass., says: "Our company was organized in the early part of 1883, and its lights have been in continuous operation since that time. We have a capacity of, say, 135 lights, of which about 40 are used for street lighting and the balance for commercial lighting. Our station which you equipped with the American system has produced very satisfactory results, the lights, so far as we know, giving entire satisfaction to our customers." This plant will probably soon be enlarged. The report made from the Hartford, Conn., Electric Light Company, by President A. C. Dunham, is as follows: "This company has been operated under the management of local officers for about a year. The results of the business have been such that the stockholders are content, and the subscribers for light have steadily and greatly increased in number, and are still increasing; while in stability as to contracts we find ourselves on a level with other people who furnish necessities. We get next to no complaints about the light. We have just voted to increase our capital, with a view to a considerable increase of plant. We are paying quarterly dividends (up to this time it has been at the rate of seven per cent. per annum), reserving a part of our earnings to development of business. Have now two hundred and eighty lights rented." Mr. J. Jephson, secretary of the Norwich, Conn., Electric Light Company, organized in March, reports 62 lights in use, and a first quarterly dividend of 2 per cent. to be paid in July, reserving something for increase of plant. Mr. Silas Gurney reports from Boston, of the Merchants' Company, of which he is president: "Our Boston station is equipped with steam for 1,000 lights, and has over 600 in operation; our East Boston station for 100 lights, and that at Revere Beach for 90 lights. We are contemplating the construction of new sub-stations in both South Boston and Charleston, and shall call upon you at an early date to construct and equip them. We use the American system exclusively, and have every reason to be satisfied with it and with our relations with the American Company. The demand for our lights was never better than now, and the electric light was never so popular in Boston as it is to-day." He sees no reason why the stock is not good as a permanent 8 per cent. security. Mr. M. J. Perry, of Providence, R. I., states that the Narragansett Electric Light Company there is operating a 200-light plant, of which 75 are city lights. Mr. J. Y. Bradbury, General Manager of the Middlesex Electric Light Company, Lowell, Mass., says it is doing well, as shown by its annual report mentioned in our electric light news this week. It is earning 8 per cent. on the capital stock. Mr. H. S. Hyde, treasurer of the Springfield, Mass., Electric Light Company, writes: "In February we put in a 100-light plant on the American system, which has up to this writing proved eminently satisfactory in every respect, both to the consumers of the light as to its quality, and to our stockholders as to our profits. We have been running 26 lights for the city, and

8 more have recently been ordered. Every lamp that we have is now contracted for, and we intend in the immediate future to increase our street lights to 50 and our commercial lights to 150, and confidently expect to be running them all in the early fall."

The Worcester, Mass., Electric Light Company has a capacity of 250 American lights, although started only eighteen months ago. It is paying a semi-annual dividend of 3 per cent., and has increased its plant 25 per cent. out of earnings.

All these facts, given by men of high business repute in their respective localities, cannot be gainsaid. If we went no further, sufficient evidence will be found above to emphatically answer in the affirmative the question with which we started.

The Boston Telephone Conference.

[*From Our Special Correspondent.*]

JUNE 11.—My letter last week closed with the mention of an excursion. The fact is, the fine weather of the latter half of the week inspired many members with the desire to "excurt;" and the consequence was that from this morning onward the attendance grew small by degrees and beautifully less. One of the interesting subjects taken up at the first and only session to-day was that of automatic switch-boards for village use, dispensing with the service of an operator. The experimental board shown was fitted up for eight subscribers. It was examined with great interest by all present, but it cannot be said that any great amount of enthusiasm was developed in its behalf. There should, however, be a field in which this kind of telephone service can be useful, and we expect to see it extensively employed before long. The various sections of a manufacturing establishment, or the various departments of a large office, might also be conveniently connected by means of such a board.

Another subject to which attention was called was Col. C. H. Haskins' time indicator for telephone exchanges, patented last October. As I understand it, the device provides a new means for watching the watchman. It consists in electric signaling apparatus whereby a signal can be sent from a subscriber's station to the central office in case the watchman fails to indicate his presence at a certain point at a given time. A screw is provided on a shaft turned by clock-work or other means at any desired rate of speed, and circuit-closers, one for each station, are added for the time service, these circuit-closers being provided with adjustable armatures, which are carried by the screw upon the revolving shaft, in combination with an annunciator at the central office and circuits. The screw tends to carry the armature-levers into contact with local contact-points placed, respectively, in the different local circuits. The watchman at a given subscriber's station, by turning the generator or closing the circuit of a battery to line, may lift the armature from time to time from the screw, thus allowing the armature to return to the zero-point, thereby preventing the armature from closing the local circuit. As long, therefore, as the annunciator makes no indication, it will be evidence that the watchman is doing his duty. If it is not convenient to place the telephone call-box so as to be accessible to the watchman, a local battery and switching apparatus can be placed in some convenient position, so that the watchman may, by pressing a key, close the battery to line, thus energizing the electro-magnet of the circuit-closer at stated intervals, so as to lift the point or knife edge of the armature from the screw, and allow the armature, actuated by the force of a spring, to be carried back to the stop which marks the zero-point. This push-key is made, preferably, in the form of a lock with a key fitted thereto. The lock may thus be placed on the outside of a building, and cannot be operated to close the circuit except by the watchman who holds the key. Arrangements are made for cutting out or shunting the circuit-closers from the circuit during the day, so as to remove the resistance of their coils from the telephone-circuits.

The afternoon was devoted to recreation, the whole Conference being invited to be the guests of the company at dinner, at Taft's. Special invitations were also courteously extended to many of those present holding extra-territorial relations with the Conference, among them being your humble servant. The party left the wharf about three P. M. on the "Wm. Harrison," a trim steamer chartered for the occasion, and, after the unwholesome confinement in the mysterious council chamber of the Vendome, there was not a conferee who failed to enjoy the run down the sunny harbor and the nimble sea breeze as it swept in from the Atlantic, untainted, briny, exhilarating.

At last, a landing was effected, the objective point was reached and a hurried game of ninepins was brought to a close by the "tocsin of the soul, the dinner bell." I abstained from counting heads, being desirous, as an appreciative guest, of not violating any secrecy, but I should say that well nigh a hundred convives sat around the tables at Taft's and enjoyed as admirable a dinner as that well-known resort could provide. An excellent feature of the occasion was the absence of speeches, but on the return trip the well-pleased guests were not to be denied, and on the initiative, neatly taken by Mr. Morris F. Tyler, a brief, manly acknowledgment of the thanks tendered was made by Mr. Forbes, who expressed the hope that the steps taken to popularize the telephone would be productive of benefit to the public, the licensees and the company. Other timely little "five-minute connections" were indulged in by Messrs. Madden, Bowditch, Gardner G. Hubbard, who spoke for Professor Bell, and Messrs. Bullock, Bennett and Uline. I do not know that I need follow the conferees in their secret proceedings after they landed. All were as bright as buttons—not carbon—next morning.

JUNE 12.—The session to-day was very short. Many of the members had struck the home trail, and others were to leave in the afternoon; but all present gave a vigorous, cordial support to the subjoined resolutions:

Whereas, The hearts and minds of the members of this conference are full to overflowing with appreciation of the liberality and kindness of the American Bell Telephone Company in affording us this opportunity of coming together as its guests, and desire to give expression to our feeling in a fitting manner; therefore it is

Resolved, That a vote of sincere thanks be and is hereby tendered to the American Bell Telephone Company and its officers, not only for the substantial benefits resulting from the Conference, and their disposition to strengthen our hands in developing the business, but for the delightful social features of the occasion.

Resolved, That we tender the American Bell Telephone Company a continuation of our hearty support and co-operation, with renewed vigor and confidence.

These resolutions were forwarded to headquarters under cover as follows:

T. N. Vail, Esq., Am. Bell Tel. Co.:

DEAR SIR: I am instructed to transmit to the American Bell Telephone Company the inclosed resolutions, which were unanimously adopted at our session this morning.
Yours respectfully, E. J. HALL, Jr., Sec'y.

Certainly, a vote of thanks was never more richly deserved. The company anticipated every want of its guests, and left no effort untried to make the week pleasant and enjoyable.

The afternoon was given up by several to a visit to South Framingham, where the State militia have their camp, but a large number took train or boat for home.

JUNE 13.—The week of "legislation by picnic" came to a very pleasant and happy close to-day. Although a minority only of the conferees was left, the ladies of the party, under the superintendence of Mr. Durant, of St. Louis, carried out the wishes and expressed the good will of all in making the offices of the American Bell Company, in Milk street, take on the guise of a florist's establishment. At an early hour of the morning the decorating party got possession, and when they had finished their labors the scene was one of great beauty and fragrance. Mr. Forbes' office was tastefully adorned, and Mr. T. N. Vail's office was for once, and "this time only," a bed of roses. The office of the blithe and jocund Mr. O. E. Madden came in for a due share of attention, and flowers were strewn with a lavish hand over the belongings of Messrs. C. P. Bowditch, Wm. R. Driver, T. Sherwin, J. A. Hudson, C. M. Whitcomb, R. W. Devonshire and T. D. Lockwood, while Mr. E. T. Gilliland, at 101 Milk street, was by no means forgotten.

INDUCTIVE "CROSS-TALK."

Not content with entertaining its guests at the Vendome, a hotel of which any city might be proud, the company provided nightly amusement for them at the theatres or Barnum's, or wherever fancy led the votaries of pleasure.

Boston, with its level, well-paved thoroughfares, offers many temptations to the enthusiastic bicyclist, and it was not surprising, therefore, to see Mr. Morris F. Tyler, in the most approved rig, go out early in the morning for a spin, and come in to breakfast trim and fresh. The intricacies of telephone management were of little concern or worry to him at such a time.

Telephone Delegate Mixed.—Hello! Lane, are you there?

Hello! J. C., where are you?

Why, here; at the Von Dome, Vendomy—Ven—Ven—dom—me—if—I—know what hotel, you know, don't you?

It should be explained, by the way, that a special telephone was put up in the ante-room to the conference hall for the free use of members. The following gentle hint was found stuck under the transmitter mouthpiece:

DEADHEAD BUSINESS MUST STOP RIGHT HERE.

Five years of the imposition is enough.
☞ Hereafter the service will be for subscribers only.
☞ Please direct all others to the Central Office, where they can use the telephone for a small charge.
☞ Fire alarm calls and physicians only excepted.

The many friends of Mr. T. D. Lockwood will be glad to hear that though he carries no superfluous flesh, he is looking much better for his Western trip. The coming winter he will deliver a series of lectures, by special request, before one of the most noted of the New England institutes, on electrical subjects, and I think his nervous, piquant—sometimes trenchant—style will appear to greater advantage than ever, on the platform. There is surely as good an opportunity in America as in England for this attractive way of explaining and popularizing science, and Mr. Lockwood will have the best wishes for the success of his lectures of all who know how interesting he can make the dryest subject.

The subject of long-distance telephony did not come under consideration at the Conference as a live issue, but a good deal of interest was manifested in it by different members during the week. Extended discussion would have been premature, but I believe Mr. E. J. Hall, Jr., who has the care of this development for the Bell Company, will soon show its remarkable possibilities. There does not appear to be much encouragement for the Van Rysselberghe system; but in spite of the cessation of its efforts to obtain the right to increase its capital, the company will, I believe, go right on with the work, putting up its own lines.

I had the pleasure of a conversation with Mr. Emil Berliner, whose memorable controversy in the WORLD with Prof. Sylvanus P. Thompson attracted attention so widely as showing him to be not only an ingenious inventor, but a very quick and shrewd polemicist. Mr. Berliner inquired kindly after his antagonist, and expressed his willingness to bestow further care on him should occasion arise; but meantime he is busy on work more to his taste, the results of which will, I have no doubt, enhance his reputation and add materially to the range of electrical application.

The telephone men were afforded during the week an excellent opportunity to inspect the new time telegraph system of which Mr. Julian E. Carey is the inventor. It had not been given publicity before, but was, with a spirit that in my opinion deserves very warm praise, thus brought out before one of the keenest and most critical bodies of men interested in electrical applications, and submitted to their searching tests. After all, when a novelty is good, this kind of courage is the best thing for it, and I do not think Mr. Carey will have any occasion to regret the highly interesting exhibit he made at the Vendome with his handsome clocks and scientific system. I am informed that some of the most prominent and influential telephonists, after watching the operation of the system and inquiring into the extent to which his patents secure him, were glad to associate themselves with the enterprise. The material was all freely submitted for investigation, and this in itself is a guarantee that the parties interested know the merit of what they have got and the validity of the title by which they hold it. The timely introduction of the subject to notice, the skillful management displayed, and the powerful organization already secured, would indicate that elements of success too often wanting in the exploitation of electrical inventions are abundantly at command here. The general interest felt promises a rapid growth, and I hear that the business will at once be actively pushed under the name of the Electric Time Company, with offices in the old Mutual Life Building, 146 Broadway. I was unable to get all the leisure I would have liked for inspecting the system in its minutiæ, but I saw enough to impress me very favorably. Some of the more noticeable features were the methods for synchronizing, so that the movements of every clock, whether regulator or dial, would act in perfect unison, and the methods for overcoming the difficulties that are wont to arise from breaking or interrupting the circuit. Another good feature was the large mechanical force obtained from the current of a single cell of Leclanché battery, as seen in the operation of a tower clock, whose face was several feet in diameter, the induced current being here used to great advantage.

Few subjects are of more importance to-day to the telephonist than aërial cables, and remembering that a new departure had been taken by the American Electrical Works, of Providence, in its "rubber group" cables, it occurred to me to ask Mr. Fred Angell how those cables were answering the purpose. I may explain that in the "rubber group" the conductors are divided into groups of 6, 7 or 8, and the central conductor of each group is covered with tin-foil; and it is the claim that while the presence of the metal insures practical working very satisfactorily, the reduction in the quantity of the tin-foil reduces proportionately the total weight of the cable—a matter of no small importance. Mr. Angell told me that the success of this cable had been most encouraging. The quantity already made reaches several hundred thousand feet. It is already in use in New Orleans and several other large Southern cities. It has found considerable favor West, notably in Chicago, and in the East there is a growing demand for it. Mr. Angell told me with some degree of pardonable pride that it was being very largely used in Boston and that it had been ordered for St. Louis. Another interesting point he mentioned was that although telephonists had shown a preference for Nos. 19 and 20 or even 22 wire, there had of late been a revulsion of feeling and that he had had to furnish wires as large as 18 B. & S. gauge. I should have liked to ask for fuller information, but my informant was too busy at the time to be as communicative as his frank nature generally inclines him to be.

Electric Lighting Combination in Boston.

It has been understood for some little time past by those well informed on electric lighting matters that a consolidation of various interests in Boston might be effected at an early date. The companies engaged in the business there are the Brush Electric Lighting Company, the New England Weston Electric Light Company, and the Merchants' Electric Light and Power Company, representing respectively the Brush, United States and American systems. The result of the keen competition of the three companies is that the metropolis of New England is now very well lighted, the total number of lamps now being about 1,500 out of a capacity of 2,500. This, it will be admitted, is a good showing for a city of the size of Boston.

Not at all unnaturally, the desire to control and monopolize this large amount of patronage has led to long and

even bitter struggles between the three companies. The American Company, being the last comer, has had to wage war strenuously against its two predecessors, and has to gain what it holds, by dint of hard work, unfailing courage and downright merit. The Brush Company, for instance, has enjoyed special advantages from the fact that one of its chief officials has also been the mayor of Boston. At last, however, it is found that the various interests at stake can be harmonized and consolidated, and as the result of negotiations, the managements of the Brush and Merchants' companies held a meeting in Boston on June 17, when terms of consolidation were agreed upon. A committee from these two was also appointed to wait upon the third, the Weston Company, to invite it to come into the arrangement, and it is said that the management of the company is perfectly willing to join.

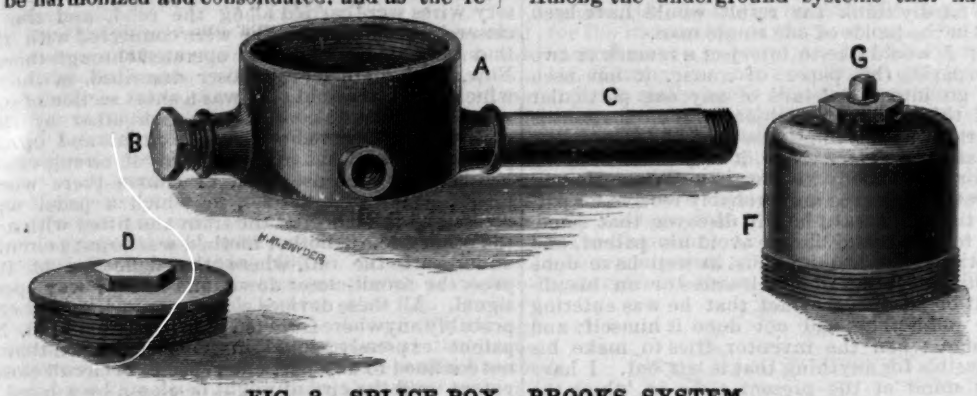


FIG. 3.—SPLICE-BOX.—BROOKS SYSTEM.

The consolidation in this case, so far as we have been able to learn the details, appears to have many features that justify and recommend it. The fight for business in the past has no doubt been greatly due to the determination of Mr. E. H. Goff, who has a large interest in the Merchants' Company, and has been resolved to obtain for it a fair share of support. Now, however, he has joined hands with those best able to give him substantial help in working out an aggressive and progressive policy, and the result should be beneficial to all concerned, putting the electric lighting business on a basis that will be highly profitable and yet enable it to compete against gas with more success than ever.

The Brooks Underground System in New York City.

The passage of the bill by the New York Legislature, appointing a commission to see that all wires are placed under ground, has raised considerable discussion and comment. It is safe to say that November of this year, the limiting time for their removal, will find a large majority of them still above ground. Since this was obvious, the law has been recently passed appointing a commission for determining the best method for the disposition of the wires; and in this way it is hoped to avoid the evils of a summary execution of the first law passed in 1884.

Still, it would be unjust to the electrical companies to assert that they had made no attempts at carrying out the law, and at the same time ridding the city streets, wherever practicable, of wires and poles. In this respect the telephone companies, especially, have advanced farther than some of the other electrical companies. Good work has been done in Brooklyn in the manner already described by us, and the Metropolitan Telephone and Telegraph Company deserves credit for its work in New York. Although it is true that proportionally few of the wires have been buried, and they only for comparatively short distances, there is shown a law-abiding spirit and a wish to seek the most feasible methods. While it may present considerable difficulties, the question of underground wires is one that can undoubtedly be solved. It is not our purpose here to enter into a discussion of the vexed question, but established precedents in England and on the continent are sufficient proof that success can be measurably attained, so that the main question now is one of expedience only.

Among the underground systems that have attracted public attention, that of Mr. David Brooks possesses a considerable degree of originality. New York City has now a large number of wires running underground in the Brooks conduit. The object aimed at in the system is to compress the largest number of wires into the smallest possible space, and to provide the highest insulation with the lowest inductive capacity of the insulating substance, so that the inductive effect between adjacent wires shall be a minimum.

In order to accomplish this purpose, Mr. Brooks runs a cable of a large number of wires through an iron pipe of somewhat larger diameter than the cable. The remaining space in the pipe is then filled up with heavy paraffine oil under pressure, and the covering of the cable being loosely woven, the oil penetrates and completely fills up the space between the wires. Thus the cable as a whole is well insulated from the ground and at the same time each individual wire is insulated from its neighbor. Our engraving, Fig. 1, shows the telephone conduit employed in this city, representing it in its actual size. In this conduit there are 400 wires laid in a thick wrought-iron pipe 2½ inches in diameter. The pipe rests in a trough of wood, and is surrounded by a filling of pitch or asphaltum, which keeps it in place, acts as an additional insulator, and keeps the iron free from moisture and consequent corrosion. As will be seen, the cable is surrounded by a thick layer of oil, which completely fills the pipe. The conduit is laid only 2½ feet underground, so that large lengths can be placed in position in a very short time.

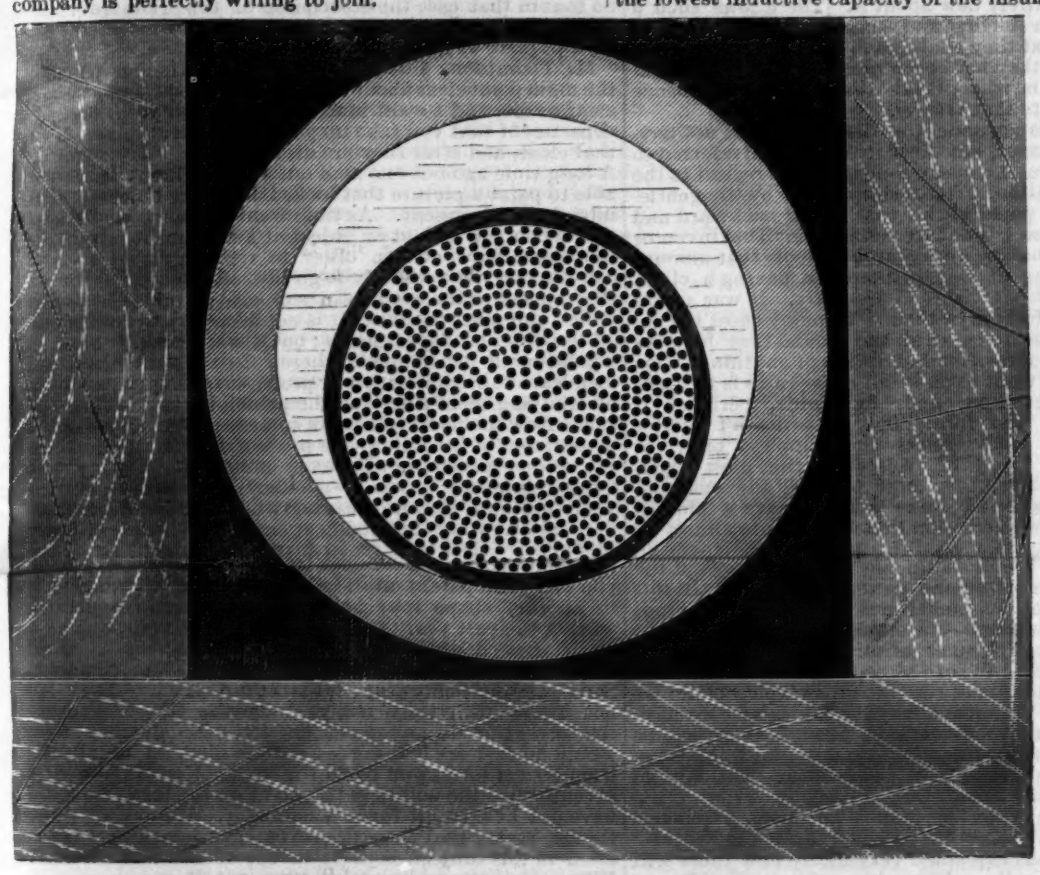


FIG. 1.—BROOKS UNDERGROUND CABLE.—FULL SIZE.

In this city there are at present 800 wires employed for telephonic purposes which are run on the Brooks system. They all run to and from the Spring street exchange, and lead to poles on different streets. One cable of 400 wires runs through Spring street to the east side of Broadway and reaches to Christie street, a distance of 2,480 feet. Along the route, however, wires are led out and connect to overhead wires on poles. Thus at Crosby street, 100 wires branch out in this way; at Marion street, 50 wires; at Elizabeth street, 100; and finally, at Christie street, the remaining 150 are run to the poles.

West of Broadway the wires, 400 in number, are carried through Mercer street, branching off to poles at Spring, Broome, Grand and Canal streets; the longest distance being 1,963 feet.

The cable, where it leaves the ground, continues through an iron pipe to the top floor of the building in which the exchange is situated, and is then separated and the wires distributed on a terminal board.

Although not employed in the present instance, the pipe is usually kept supplied with oil by a tank, Fig. 2, situated at an elevated point on the line, so that pressure and oil supply are constantly maintained.

The cables are drawn into the pipe in convenient lengths, and Fig. 3 represents the splice-box having a hand-hole and outlet on each side. Reducing sockets can be introduced at *B* for a smaller pipe and less number of wires. These boxes are introduced at intervals, and fastened with a plug *D* for bringing out the wires. The box is from seven to twelve inches in diameter inside. When used for splicing the ends of the cable, the dome *F* is screwed into the top of the box. *G* is a plug in the top of the dome for pouring in oil after the splice is made, and on either side of this box is an outlet *E*.

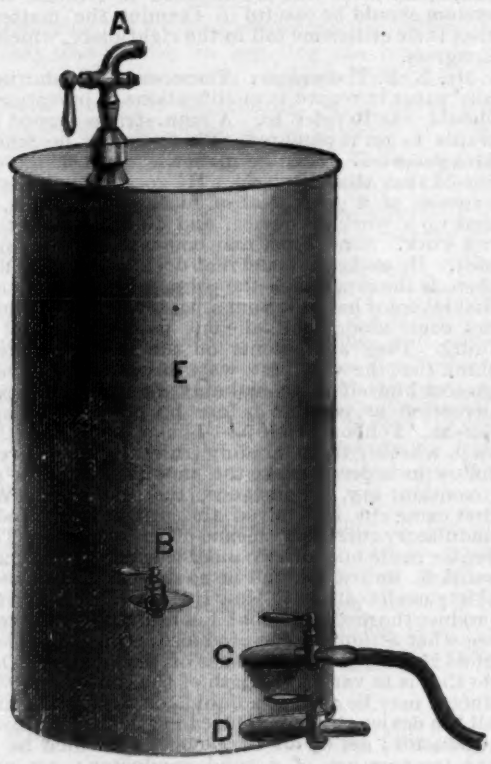


FIG. 2.—OIL TANK.

The system also provides for leading wires into buildings along the route of the cable. Fig. 4 shows the hand-holes and outlets for taking wires into adjoining buildings. In Mercer street these are placed every 45 feet. It will be noted that no oil is used in the service connection leading to buildings, the wires passing through a sleeve of plaster of Paris, which effectually bars the flow of oil.

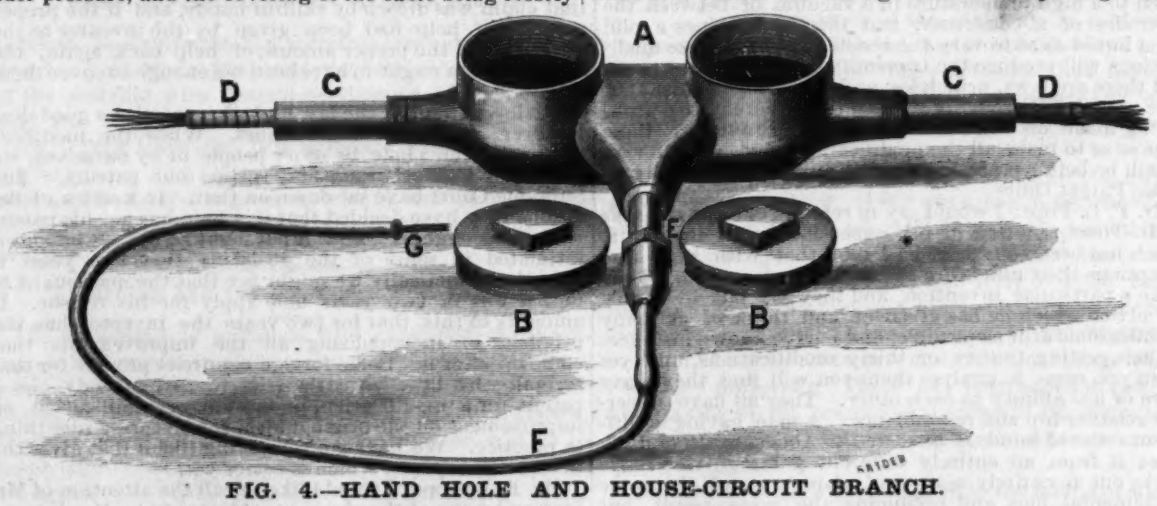


FIG. 4.—HAND HOLE AND HOUSE-CIRCUIT BRANCH.

We recently had occasion to inspect the Brooks installation in the Spring street exchange, and applied the telephone to the different wires in the conduit, both long and short. In all cases inductive disturbances were very slight, being almost imperceptible in the shorter lines.

The Protection of Electrical Inventions.

Subjoined is the discussion of the paper read by Mr. Frankland Jannus, on the protection of electrical inventions, at the meeting of the American Institute of Electrical Engineers, and published in our issue of May 30:

Mr. F. L. Pope: Mr. Chairman, I do not know that I can add very much to what our friend Mr. Jannus has so ably stated in his paper. The remarks which he makes about the examiners in the Patent Office are very proper. Those gentlemen are subjected to much unjust criticism. I have practiced before them more or less for some fifteen years. I have almost invariably found them courteous, careful and honest in their work. They labor under the disadvantage of having so much work thrust upon them, so much work to be done with an insufficient force, and with an insufficiently paid force; and to every one familiar with the circumstances, as most of our solicitors and practitioners are, the only wonder is how the work is done as well and with as few mistakes and as little injustice as is the fact. We all feel that there might be a great many improvements made in the management of things at the Patent Office; but the difficulty is in the lack of adequate legislation, not in the character of the examining force, for it is better than we might have any reason to expect we could get for the salaries which the government affords it. They are obliged to pass over many cases with an insufficient examination; to allow many patents which they feel contain nothing of novelty, and which if they were allowed sufficient time they could undoubtedly find an anticipation of. It is often said of those patents which have no originality in them, that if they are good for nothing they will do nobody any harm; but as a matter of fact they are often taken up by unscrupulous speculators, and used to levy tribute upon the deserving inventors who have worked at something of real value which they are endeavoring to bring before the public; and some unscrupulous speculation with a worthless patent, which apparently on its face covers the whole matter, is brought up and very often capitalists are discouraged from aiding the real inventor. I think that the general subject is worthy of more attention than it has received, and I think that those who are disposed to criticise our patent system should be careful to examine the matter and see that their criticisms fall in the right place, which is really Congress.

Mr. E. P. Thompson: There was one point in Mr. Jannus' paper in regard to modifications of inventions which I should like to refer to. A man strikes a good idea. He wants to get it patented. He finds that he cannot get an idea patented. Then he makes a rough sketch of it. He is told that that won't do. He goes to work, and at the expense of a good deal of mechanical genius, perhaps, gets up a working device, and then he finds that it will not work. Some other man comes along who takes up the idea. He makes a model that does work. The first thing, then, is the invention—the principal invention. After the first inventor has taken out a patent, scores of other inventors come along and take out patents on about the same thing. They are patents on the modifications. Now I think that the very best way in which an inventor can protect himself is to make as many modifications of his invention as possible before he proceeds to apply for a patent. For some time past I have thought on the subject as to whether there are any rules that an inventor may follow in order to make the modifications of a particular invention; say, for instance, the telephone. When that first came out it involved the principle of producing an undulatory current by means of a transmitter. The first inventor made one or two modifications to illustrate his invention. But why didn't he go to work and make twenty or thirty modifications? How is the inventor to go to work to produce the modifications? Let him study his invention and see what action is to be produced. One principle to be applied is to vary the resistance of the current. One way to do that is to vary the length of the conductor. That conductor may be a solid, a liquid, or a gas. Let him get up all the devices by which he can vary the length of a solid conductor; get up all the devices by which he can vary the temperature of a solid conductor; get up all the devices by which he can vary the density of a solid conductor; get up all the devices by which he can make or break the different parts of a solid conductor. Then he goes to the liquids and gets up all the modifications relating to liquids, and even goes so far as to introduce the principle of electrolytes and electrodes, varying the size of the electrodes, varying the heat produced in the electrolyte, which will, of course, vary the resistance; varying all of these different things combined. Then he may go to work with the gas and vary the resistance of a gas raised to a high temperature in a vacuum or between the electrodes of a condenser, and then he combines a solid and a liquid so as to vary the resistance. All these modifications will produce the transmitter; and it seems to me that there are laws, principles and rules which exist, but have not been thoroughly worked out, whereby a person, having made an important invention, can follow these rules so as to make all the modifications, and in that way he will be better protected than by any law of the United States Patent Office.

Mr. F. L. Pope: I would say in reference to the remarks of Mr. Thompson that in my experience with inventors, which has been considerable, I find that with very few exceptions their minds are apt to run in a groove. They make a particular invention, and they set out to follow the advice which he has given us, and think of as many modifications of it as possible, and I have known instances of their getting twenty or thirty modifications, and yet when you come to analyze them you will find they have more or less affinity to each other. They all have a certain relationship and resemblance. A man having a different order of mind is attracted to the subject, and he takes it from an entirely different point of view. He works out an entirely new set of adaptations of the same fundamental idea and producing the same result, but utterly unlike anything the first man could ever possibly have thought of. Take the instance of the telephone which Mr. Thompson alluded to. Prof. Bell in his invention of the telephone produced his undulatory current by vibrating an armature in front of the pole of a magnet and thus inducing a magneto-current. Of course, he saw that that was not the only way of producing an undulatory current, and he said in his patent that it might be done in various ways by vibrating the two parts of the conductor in an imperfectly conducting liquid, and by vibrating the plates of the battery and various other things, but he suggested no practical way of working on that plan. A host of other experimenters and inventors went to work at it, and among them they discovered that carbon was the only substance that would do it. That was discovered by experimentation, not by reasoning; perhaps by reasoning and then trying; but it is a result that perhaps would have been difficult to get at by the particular process of reasoning which Mr. Thompson thinks of. At the same time it is very clear that that would in many classes of inventions serve to cover the whole ground. I merely mention the case of the telephone as one where I hardly think the result would have been brought about in the hands of one single man.

Mr. Jannus: I would like to interject a remark or two myself. In preparing this paper, of course, it has been impossible to go into the details of any one particular branch; but I think that the subject of modifications is fully as important as anything else that the attorney or the inventor has to consider. Now, it very often happens that an inventor will embody his idea in a device. He will have an application prepared and probably receive his patent, and some time afterward he will discover that somebody is trying to get around him to avoid his patent, and has done something that he might just as well have done himself, and that by reason of carelessness or an insufficient appreciation of the contract that he was entering into with the public, he had not done it himself; and then is the time when the inventor tries to make his attorney responsible for anything that is left out. I have a case in my mind at the present time, in which the papers were sent to the attorney three times by the inventor and three times returned to the inventor by the attorney. Each time the attorney told the inventor: "You have shown so much and you have suggested so much more; now you have got to do your own inventing. If you choose to bring that in, give us a sketch; if not, understand that it is going to be left out." Finally the case went into the office after a third revision, and was allowed without an objection. There was something entirely new about it. There was such a difference between the first and second and third sheets of those drawings that they could each one have been separately patented if they had been presented by three separate men. That is why I think that special prominence ought to be given to that always.

Mr. Stetson: I labor under the disadvantage of not having heard all the paper, but the matter has been referred to since so clearly that I can say something in regard to the matter of modification. The history given by the gentleman who read the paper of the case going backward and forward several times, is an interesting one. That inventor was fortunate in having an agent who took that amount of pains, and the agent was fortunate in having a client who complied with his wishes so promptly. It was a case of a good job due to both of them. In many cases the inventor is so anxious to cover all the ground that he does not give a specific and exact description of anything. One of the things we want to do in all these cases is to make one specific description, and, by rights, perhaps, it ought to be the best form, but that doesn't matter so much. You may select the simplest one; or sometimes I am fond of selecting the most complex, the most *outré*, the most *bizarre*, the one that has the most heads and horns to it. I have a kind of stereotyped form of expression that I work into almost all specifications, saying that modifications may be made in nearly all points without sacrificing the advantages of the invention, and then go on and enumerate a few. In this matter of modifications sometimes this state of things arises which is of interest—the main, bottom principle has already been covered by some absurd thing which would not work, and we find the art already advanced to such a stage that we cannot make the broad, sweeping claim we want to. In fact, it almost always seems so, and we have got nothing left but modifications, though there will be modifications of the modifications, and so on. In one case I had a steam pump matter—a pulsometer. The bottom thing had been done by somebody who made a poor one. Then came a man who made a sensible one, the one that has been used all over the world—Hall. Mr. Pope has explained very nicely how there will generally be a family relationship with these different things if they all come from the same man. But a man that is ingenious can make a good lot of modifications. I was the agent who probably ever took out the most patents on one thing on the same day—twenty-nine. On the 30th of May, 1882, twenty-nine patents were issued to one man on a matter of steam pumps, and the man tried with considerable success to cover all the modifications that could be made that were good for anything, except the one that had been specifically stated in the original man's patent. Now, if the original patent has got a particular claim, and that claim was drawn by skillful hands, and if the proper amount of help had been given by the inventor to the attorney and the proper amount of help back again, the original claim ought to have been big enough to cover them all.

We have changed the law and the practice a good deal with regard to obtaining reissues. When the modifications had been made by other people or by ourselves, we would go to work then and reissue our patents. The Supreme Court have sat down on that. In a series of decisions they have decided that if a man has got his patent wrong he ought to find it out right away. It has been intimated in some of the decisions that two years is enough. Practically we might say that the man ought to find it out in two years and apply for his reissue. It amounts to this, that for two years the inventor has the privilege of monopolizing all the improvements that come up after it. Some foreign countries provide for that formally by law. Austria tries to give nobody else a patent for a modification, or branch, or ramification, or improvement on the original idea, for a year—a nice thing in practice. We have got something like it that gives the inventor two years, which is better yet.

Mr. F. L. Pope: I should like to call the attention of Mr. Stetson to one of the decisions referred to by Mr. Jannus, a recent decision of the Supreme Court, and I hope I may be pardoned for mentioning it, as the suit arose on a patent of my own of which I drew the specification myself. It was on this very question of modifications. It was the case of the railway signals. The patent was for a system of circuits for operating signals automatically by the movement of a train along the line of the road. Now everything about that was old. There had been innumerable forms of signals worked by electro-magnets and batteries, and having the circuit closed in some manner by the train moving along the track; the idea being that as the train progressed from one signal station to another, the signals would be exhibited in orderly succession behind the train and the track be kept clear for the succeeding train. The most common plan had been to have one signal for each section, with its own battery and its own circuit closer, and its own separate electric circuit. This improvement which was intended to be obtained was a system of circuits by which one battery was made to do the work of the several individual batteries which had before been scattered all along the road. One battery was placed at some convenient point and two battery wires were carried along the road, and the circuit-closers' signals and the like were connected with them, so that only one signal was operated through those wires. Now, the form of circuit-closer described in the patent, which was a very old one, was a short section of insulated wires brought into contact with each other by the locomotive, which served to close the circuit and operate the proper signal. That was one form of circuit-closer that had been long in use; and of course there were other forms, some well known, in which a pedal would be pressed by the wheel of the train and fitted with a key at the other end. Another method was to put a circuit-closer underneath the rail, where the deflection of it would press the circuit-closer down, and in that way operate the signal. All these devices were very old, and there were probably anywhere from ten to fifty of each kind. Now the patent expressly stated in its specification that it was not confined to any particular species of circuit closer. The patent said the circuit might be closed by a hand circuit closer, for that matter. The novelty consisted in the arrangement of circuits to work all the signals from one battery. But the Supreme Court held that because the defendants did not use the particular kind of circuit closer, that is an insulated rail (instead of that they used a key which was operated by the depression of a lever by the wheel), they did not infringe. Now, that might have been true if that method of closing the circuit had never been known before; but in fact it was the oldest form there was. So that in that case the description of the preferred form and the statement that other well-known forms might be used in place of it, did not answer the purpose.

Mr. Thompson: I do not know exactly whether I made the main point clear about these modifications; but it seems clear to me, and I want to make it clear to you. In any department that you take up you find the rules, the laws that exist, and after they are discovered they are applied. A long time ago but one man out of a million would be able to paint a picture that looked like the object it was intended to represent. As time went by somebody noticed that when you look at an object at a distance it has a certain appearance, and in order to represent that on the canvas it is not necessary to go into all the details just as they appear to the eye; but there are certain deceptions which you must produce. It is not necessary to go through all the different departments; but it is the same, I think, in a great many departments where rules are established, and men learn to become artists or professors in any department by studying those rules and the principles underlying the rules. Now that method has not come to perfection yet in the department of invention; the process of invention has not yet become a science. The examiners sometimes say that a thing shows no "inventive genius." To me the term "inventive genius" has no meaning when used in reference to derived inventions or modifications. For instance, I say to a man: "Here is a carbon filament shaped like a figure 8; if you make that carbon filament in a different shape, you can get a patent on it." Now the man who makes it in another shape may not have any inventive genius. During the past year two patents have come out, one on a kind of a double figure 8 and another on a spiral—absolutely on the form of the carbon filament. Some people may say that is no good. They do not know until they really study the thing, whether the invention is any good or not. So another man would go to work and make a carbon filament of all the geometrical forms you could think of. Now if the first inventor had the will to get a patent on the form, he could have got hold of all forms imaginable. I speak of those things, seeing that there are several gentlemen here interested in this subject, both as inventors and as attorneys. When they see any invention come out, if inventors will notice what rule they can follow in order to apply that same principle of invention in some other department the number of inventions will be multiplied, and by multiplying the number of inventions civilization is furthered.

Mr. F. L. Pope: I do not wish for a moment to be thought to say anything disparaging of Mr. Thompson's plan, for I think the systematic study of all these things is of the utmost value, and that inventors' work would be a thousand times better done if they would reduce their thoughts to some system and follow it out in a connected manner; but still I think it is a mistake to suppose that any system of that kind carried out to however great a perfection would necessarily develop all that there is in any one line of invention. It seems to me that the matter of invention does not differ materially in that respect from the matter of painting pictures or composing music. Every artist does a great deal better work for having a systematic, thorough course of training in all the principles of the art. It is the same in music and it is the same way in many other things. But after all that is not the way in which great composers or great artists or great inventors accomplish their work. It is of the most valuable assistance to them and of most necessary assistance, but still it is not everything; there is some inspiration beyond that. Mr. Thompson does not understand that there is such a thing as "genius" in these matters. I think there is a little. But, as I say, I heartily concur in everything he has said about the importance of systematic study, and I think Mr. Thompson is entitled to great credit for being the first one, so far as I know, to develop such a plan of investigation. I think the work that he has done will be recognized in all future time as of very great importance; but, as I say, I don't think it covers quite the whole ground.

Mr. Thompson: I wish to correct what may be considered a mistake in regard to inventive genius. There is inventive genius, in my opinion, in the first conception, but in order to make the modifications of that invention I think the work can be followed out by rule.

Mr. E. P. Roberts: If I want to get up any little thing, I say to my man, and he is one whom I trust thoroughly, "I want to do so and so; you think it over, and put down on paper what you think about it." I put down on paper what I think of it. He shows his plan to me, and I show him mine already drawn out, and we compare them together, and they may both have points that may be worked together, and in that way we often cover points

that neither of us would think of. I think inventors as a general thing are not trusting men. If they could trust other men and work together, I think it would be advantageous.

Mr. T. C. Martin: It will be remembered by Mr. Jannus that at our meeting in May of last year a resolution was adopted, "That the chair appoint a committee of three, who shall take such action as they may deem proper, with a view to calling the special attention of Congress to the needs of the Patent Office, especially in regard to the class of electricity."

I may say that there was a good deal of contemplated patent legislation last year, and in view of that fact the Council held its hands. It appears that some action might properly be taken this year. As to the needs of the Patent Office in regard to electricity, I would like to call attention to a paragraph in our first Volume of Transactions, from the valuable paper read by Mr. Kintner. He asks the question: "Now, gentlemen, what do you think of a bureau of scientific experts upon mechanical, electrical and chemical technics, without any mechanical workshop, without any electrical apparatus, and with a laboratory having a total valuation of less than $500?" That statement has a very direct bearing on this question of protection of electrical inventions, and I think that the Society might strengthen the hands of the Council by asking them to put into force the resolution passed at the meeting last May. There is one point on which I would like to ask Mr. Jannus a question, relating to that same matter. Mr. Jannus here says: "The Patent Office is responsible to nobody and guarantees nothing." Are we to accept that, gentleman, as it stands? Are the inventors to understand that? Are the patent lawyers of the country to understand it? There are now over six thousand electrical inventions patented in this country. It seems to me that the number is not likely to be very largely added to if it is to go on record without any modification or explanation that the Patent Office guarantees nothing and is responsible to nobody. It seems to me also it is not of much use for this Society to seek to bring about a reform of the Patent Office if it guarantees nothing and is responsible to nobody.

Mr. Jannus: That is an exceedingly pertinent question, and I am glad that it has been asked. I say here that "the Patent Office is responsible to nobody and guarantees nothing." I stick to just exactly what I said there. The Patent Office is a sort of an investigating bureau to which an application is submitted, and the duties performed there are simply to examine that application, and if they can find anything to anticipate, to reject it on those references. After which the applicant may amend his claims, and when he gets his claims down to a point that is satisfactory to the bureau, the patent is issued. Of course, the courts are ultimately the tribunals before which the question is settled. If the Patent Office grants an inventor too much, it is cut down. If it grants too little, the courts have said, "You ought not to have accepted the patent; you ought to have insisted on more." It seems rather a bold statement to say it is responsible to nobody and guarantees nothing, but it is literally true. Those gentlemen are there to act on what is before them. Now there is no penalty whatever on the part of the examiner to cite a dead reference even if he has it in his portfolio. But there are many classes to-day in which the art is not thoroughly represented in the Patent Office, and consequently it is an impossibility for the examiner to know what has transpired. Patents are granted every day for things that are old, but the Patent Office does not know it. Now, what are their sources of information? Patents that have been granted, foreign patents, publications and in some instances a few catalogues from leading manufacturers. I might suggest that in the class of velocipedes the Patent Office is behind the time. I think that at the present day the examiner in that class has in his room or office notes or catalogues that show ten times more than any patents that have ever been published, and you will easily see how it is impossible for them to overlook pertinent references without intending to do so. Now if a patent is declared invalid to-morrow, the examiner does not suffer in any way. He is sorry, perhaps, but he does not suffer. There is no penalty attached. He does not lose his salary or his position; and I made that statement to call your attention to the fact that it is for the individual through counsel or by himself to investigate the matter as well as he can and be just as sure as he can make himself that what he gets he is entitled to; that what he is entitled to has been put in the best possible form, because if those two circumstances can occur he has got a patent that will be sustained by the courts to the end of his term, and which nothing can endanger; and it is only that sort of a patent that is good.

The Chairman (Mr. Sydney F. Shelbourne): I observe that Mr. Jannus uses the terms "responsible" and "guarantee" in their legal sense. It would be impossible to bring a suit against the Commissioner of Patents or the Examiner for making an error.

Mr. Martin: That is exactly the point I wished to have explained. It might go out to the public that we had coolly accepted the statement that it was the case, and I would not like to have it go out in that way.

Mr. Jannus: I am sorry I did not answer the question; I thought I had, but it seems I did not. From the Commissioner down, the Patent Office officials are judicial officers. Their acts are those of discretion largely. They use their judgment and they decide. They are not responsible legally to anybody; if they make a mistake you can bring no suit against them; you can recover nothing from them. There is, however, one method providing for rectifying mistakes as soon as may be, which is this: if a patent has been granted to the wrong person, and the right person comes in subsequently and makes the fact apparent to the Patent Office, they will grant him a patent also, so that while they cannot cancel a patent once granted, they will grant a second one, and it is expected and assumed that the evidence brought forward to justify them in granting the second patent will be sufficient to demonstrate subsequently the right of the later applicant. But the final decision of the question goes before the court, and is there decided and there only.

Mr. Pope: I would like to ask Mr. Jannus whether some measures have not been taken within the last year looking to the procuring of a laboratory for the Patent Office. I had some conversation with the late Commissioner at one time within the past year, and I gathered from what he said that some movement was on foot which would probably result in the providing of a considerable amount of apparatus for them, and perhaps Mr. Jannus can tell us if anything has been done which might render action on our part superfluous with regard to this resolution.

Mr. Jannus: There has been discussion on the subject. It has been considerably agitated; but as a matter of fact, the Patent Office is almost in the same condition as it was before, so far as we are concerned. There is no chemical or electrical laboratory there at all. There have been a few incandescent lamps put into the building, and of course the apparatus necessary to operate that is there for the instruction of the new men. But that is all. The Commissioner, however, has had his attention called to it. Mr. Kintner has made continued efforts in that direction, and it is really hoped that the next Congress will do something about it. I think that a memorial or some such step might be taken to call the attention of the Committee on Patents to the subject, which would be of some advantage. They proposed to have a building. They have plans of a shed to use as a laboratory, but nothing whatever has been done.

The Chairman: At our last meeting the following resolution was passed: "Resolved, that the Chair appoint a committee of three, who shall take such action as they may deem proper with a view to calling the special attention of Congress to the needs of the Patent Office, especially in regard to the class of electricity." It does not appear that that committee was appointed, and if some member will offer some motion with reference to taking action on that subject, it may be referred to the Council and assume shape and activity from that source.

Mr. Jannus: To bring the question before the meeting to dispose of, I move that the matter be referred to the Council, with the suggestion that they appoint a committee of their own number to present the matter to Congress in such form as may seem to them best. Motion carried.

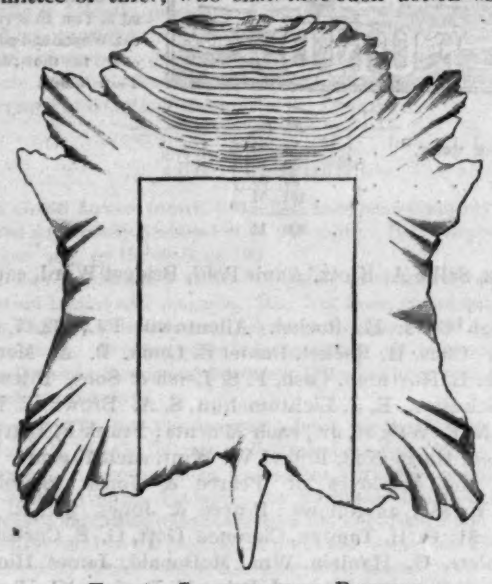


FIG. 1.—LEATHER FOR BELTING.

"Electric" Leather Belting.

One of the most vexatious annoyances attending the operation of dynamo-electric machinery is the stretching of belts, which causes slipping and fluctuation of speed, and the effects of which are immediately felt in the lighting circuit. Recently Messrs. Chas. Schieren & Co., of this city, have introduced their so-called "electric" belting, which is designed especially for driving dynamos. In the manufacture of the belts they employ the most solid and central part of the hide, as shown in Fig. 1, discarding all the spongy flank leather. In addition, the leather is given a special coat of dressing, which fills the pores of the leather completely, making it more pliable, but impervious to dampness, and therefore less liable to stretch. Another important feature of the belt is the employment of the metallic wire fastenings shown in Fig. 2. These hold the leather firmly together and obviate the use of rivets. They leave the belt perfectly smooth, so that it can be run on both sides with equal advantage. These belts are in use in a large number of electric light stations and give great satisfaction, as attested by numerous testimonials.

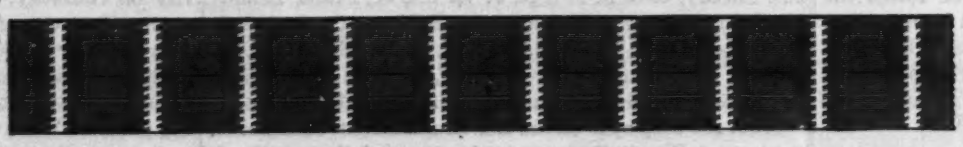


FIG. 2.—BELTING FOR DYNAMOS.

Lightning and the Washington Monument.

The committee of scientists who examined the Washington Monument after it was struck by lightning have not yet made a formal report of the changes they deem desirable to prevent a similar accident. As it is known, however, that their principal recommendation will be to supply additional points on the roof of the monument for the lightning to strike, Col. Casey, who has charge of the monument, decided to take immediate steps for temporary prevention from lightning, fearing that a chance bolt might strike the monument again and cause even more damage before the entire changes which might be recommended could be made. With this view, after submitting his plan to one of the committee, who immediately approved it, as it was in the direct line of the intended recommendations, Col. Casey went to Philadelphia and ordered four copper rods, three-quarters of an inch in thickness, which are to extend to the outside of the roof of the monument, one for each fall of the roof, and to be in direct connection with the four copper rods which extend from the iron pillars which compose the framework of the elevator to the base of the capstone. The four additional rods will each terminate in seven branching gilded needle points. It has been determined by experience that the interior lightning rod apparatus is capable of conducting all the electricity that could possibly come from any storm, and, with the additional outside facilities, it is thought that all danger from lightning will be averted.

There will be with the aluminum tips, 29 lightning rods on the roof of the monument for the lightning to strike and be conducted thence without damage into the ground. It is almost impossible for a bolt to strike at such an angle as to escape the roof with its many points of attraction. Unless some unforeseen accident interferes, the new lightning rods will be in place and ready for duty by June 19. In case the committee has any additional recommendations, they can be carried out without interfering with the precautions taken in advance. Since the accident occurred, Col. Casey has been daily receiving communications from every part of the country giving advice and recommendations for the future protection of the structure. Probably every lightning-rod agent in the country has written to Col. Casey in glowing terms of the peculiar advantages of his rod, which, if placed upon the monument, will insure safety in the future. Many of them evidently believe that nothing has ever been done to prevent the monument from being struck. Some of the recommended preventives are ridiculous. One anonymous letter advises that the entire roof be covered with metal, and that the covering project 10 inches beyond the faces of the shaft, so as to ward off the bolts from them.

Determining the Work of Electromotors.

In determining the working conditions of electromotors, the ordinary plan consists in applying the brake to the motor and varying the load as required. This, however, introduces a source of uncertainty, as the fluctuations, which occur when the brake is the absorber of power, cause variations of speed, and consequent fluctuating readings in the instruments. In order to overcome this difficulty, and to render the speed of the motor absolutely uniform, Professors Geyer and Denton, of the Stevens Institute of Technology, have devised an ingenious method, which gives excellent results. In order to make the work of the motor uniform, they cause it to drive a dynamo, the current of which is sent through resistance coils, which are kept at a constant temperature by the air circulating around them. This dynamo is mounted on the cradle dynamometer of Professor Brackett, and thus at the same time the power exerted by the motor is accurately measured. We have, therefore, a dynamo generating current for the motor, and a second dynamo as the absorber of power. By merely changing the resistance in the coils above mentioned, the work of the motor can be readily altered to any degree and kept uniform for an indefinite length of time. For testing purposes this method is evidently superior to the brake, and in addition permits of the use of a dynamometer specially adapted to dynamo and motor testing.

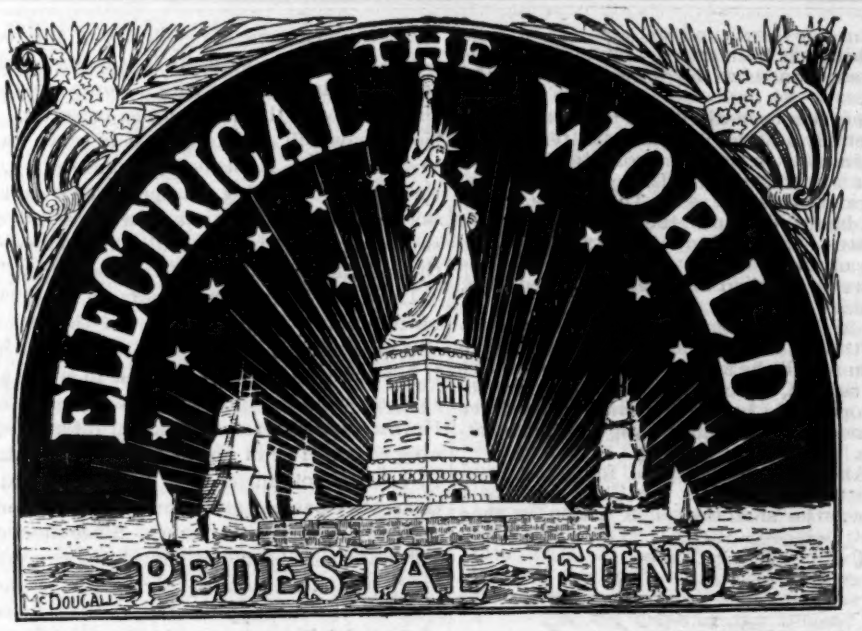
Where Western Union Stock is Held.

Mr. A. R. Brewer, the secretary of the Western Union Telegraph Company, has addressed a circular to the stockholders, in which he says that a copy of a statement sent to the stockholders about Jan. 1, now carried forward to date, shows that the amount of investment stock has further increased (notwithstanding the advance in the price of the stock since the date named) until seven-eighths of the entire stock of the company is held in the names of investors. The number of stockholders is also larger than ever before. The confidence thus indicated, says Mr. Brewer, resulting from the company's eleven years' regular dividends, will, it is believed, be gratifying to the stockholders.

After quoting the figures in tabular form, the circular says: "Since January, 1881, when the American Union and Atlantic & Pacific telegraph companies were taken in and the capital stock increased to $80,000,000, the number of shareholders has increased from 1,701 to 4,726, and in the same period the company has paid eighteen quarterly dividends, amounting in the aggregate to $23,000,000, and invested $5,359,119.75 in new and additional telegraph and telephone properties. There has been added to the plant since taking up the companies mentioned 129,659 miles of wire and 3,110 new offices, and further additions are constantly being made."

Mr. Brewer is discreetly silent as to the merits of a good, active competing company, in keeping a close concern like the Western Union wide awake, but we have an idea that keen competition has had a good deal to do with this show of activity. The increase in the number of offices and the mileage of wire would indicate considerable energy; but increase of "investors," from 1,701 to 4,726 in four years, according to Mr. Brewer's statement, might be construed by some unfriendly people to show that just 3,025 "lambs" have been persuaded to take in so much stock as Jay Gould might have been quietly "unloading."

The people of the Republic of France have presented the people of the United States with the Bartholdi Statue of Liberty, in commemoration of the first century of American national independence. It is the grandest and most magnificent gift ever made by one country to another. The cost, $250,000, was raised by popular subscription, and it is now proposed to defray the cost of the Pedestal in the same way. The *New York World* has undertaken to raise the $100,000 necessary to complete the Pedestal, and has already received about $50,000 from more than 50,000 persons.



The Statue, which will arrive here in June, is to stand on Bedloe's Island, New York Harbor, will be illuminated nightly by the electric light, and will thus serve to exemplify the triumph of the latest development of electricity, as well as the friendship of two great Republics The movement is one, therefore, in which all interested in electrical pursuits and industries should be proud to take part All subscriptions entered on this blank will be acknowledged in THE ELECTRICAL WORLD and paid over to the *New York World*.

	Ft.	In.
Height of bottom of foundation-mass above mean low water,	13	00
Height of foundation-mass,	52	10
Height of pedestal,	89	00
Height of top of torch above top of pedestal,	151	01
Height of top of torch above mean low water,	305	11

The Electrical World Bartholdi Pedestal Fund

The work of raising money by popular subscription for the pedestal on which to place the Bartholdi Statue of Liberty, just arrived per Isère, is going on bravely. The New York *World* has already acknowledged the receipt of $75,000 out of the last $100,000 wanted. There is now not the least doubt that the whole sum can be raised, and we therefore invite our readers to send in their slips and subscriptions as soon as they can. Blanks for canvassing may be obtained from this office on application.

We are glad to note that Mr. Thomas A. Edison, whose name will ever be remembered in connection with the electric light, has put his name down as one of those who will give $250. Other well-known inventors in the electrical field have a good example set them.

But, after all, it is proper that as many people as possible shall help in this work, and hence small subscriptions are desirable, so that *all* shall feel they have aided to cement international friendship, and to honor the principle upon whose vitality the welfare of republics depends.

It will be seen that we acknowledge receipt below of a handsome amount, from all parts of the country. There should be no sectional or local feeling about this matter. We have received during the past week two letters, one from a Western city and the other from California, in which the assertion is made that if the statue had been sent to either locality, the money would have been raised on the spot without help from strangers. We would point out that the gift is not made to New York, but to the nation as a whole, and that it is wisely put at the entrance to New York harbor, as being there likely to be seen by more people than could see it if it were placed in some region remote from the large centres of population. Moreover, M. Bartholdi himself declares it was not until he saw New York harbor that the definite plan outlined itself in his mind. He then exclaimed: "Yes, in this very place shall be raised the Statue of Liberty, grand as the idea which it embodies, radiant upon the two worlds." It would have been entirely wrong had New York alone raised the hundreds of thousands of dollars necessary to begin and complete the work.

Four Hoodlums, Chicago, $1.

Henry Beddoe, Rolla, Mo., $1.

W. D. Tibbets, Mansfield, Mass., $2.

Through R. W. St. Clair, M. D., 667 Willoughby avenue, Brooklyn, N. Y., $8, as follows: R. W. St. Clair, M. D., Miss Nellie St. Clair, Mrs. E. St. Clair, Miss E. V. Wallace, Miss S. C. Wallace, H. L. D. Woodruff, M. D., Miss Emily Richmond, Master Eugene Richmond, each $1.

Through L. E. Klotz, Mauch Chunk, Pa., $4, as follows: L. E. Klotz, $1; Sallie L. Klotz, Robbie L. Klotz, Mabel E. Klotz, Emma L. Klotz, Annie A. Gallagher, Bridget McGinley, Eunice McGinley, Dennis McGee, Robert Klotz, Sallie A. Klotz, Annie Pohl, Bridget Ward, each 25 cents.

Through Chas. H. Rockel, Allentown, Pa., $2.15, as follows: Chas. H. Rockel, Daniel E. Lersh, B. A. Metzger, Wm. L. Hartman, Cash, F. S. Lersh & Sons, Bittner & Hunsick Bros., E. J. Lichtumchun, S. A. Brown, E. K. Weller, R. E. Wright, Jr., each 25 cents; Frank E. Hittle, C. W. Leh, Harry Neil, Robert W. Wint, each 10 cents.

From the employés of Pearce & Jones, 79 John St., N. Y., $13, as follows: Pearce & Jones, $5; R. J. Sheehy, $1; G. H. Tamlyn, Clarence Gott, G. E. Corbett, W. Pohlers, G. Hanlein, Wm. McDonald, James Hickinson, each 50 cents; Edward Price, H. Renison, O. Horn, Phillip Gemundt, Fred. Webeling, G. Winkler, J. Herbute, A. Morawski, C. Rust, E. Schueber, Harry Roff, Richard Nevett, 25 cents each.

From the employés of the Electric Manufacturing Company, Troy, N. Y., $8, as follows: Robt. J. Pratt, Geo. H. Emis, J. S. Heally, Ambrose Kelly, each $1; D. H. Halloway, William Roberts, Edward K. Curtis, W. W. Westbrooke, Cassius W. Halloway, Chas. W. Priest, Daniel White, F. Taplin, Cash, W. Kane, A. E. Bonesteel, I. H. Williamson, A. J. Bennett, Arthur Thome, M. W. Rogers, R. Wiley, each 25 cents.

From the employés of Daft Electric Light Co., Greenville, N. J., $17.25, as follows: Geo. Daft, $5; Wm Vzenne, $1.25; John N. Bruns, Fred. H. Reed, John Riddell, Peter Cranford, Geo. W. Mansfield, H. F. H., each $1; J. Wahlen, C. J. Jungerman, E. Herz, Charles Behring, Andrew Riddell, James Anderson, each 50 cents; Max Blank, Thomas Langan, H. Craif, F. Sefren, George Krans, Wm Krans, H. Hargraves, F. Gunther, each 25 cents.

Through J. R. Watson, Sacramento, California, $7.50, as follows: J. R. Watson, W. R. Ormsby, L. Gambach, W. S. Uren, A. P. Booth, H. E. West, Geo. W. Ellery, E. B. Osler, Daniel Flynn, John Balge, Wm. McKenzie, Jas. Sheedy, Geo. R. Driggs, J. W. Clarke, Frank Lenoir, M. Eichrodt, B. A. Worthington, E. Uren, C. C. Bonté, C. J. Lenoir, A. A. Goddard, Alexander Smith, G. J. Turner, Fred Schnauss, J. E. Crum, J. C. Clifford, Cash, W. E. Gerbue, Chas. S. King, A. Abbott, each 25 cents.

From the employés of the Belt Department of Chas. A. Schieren & Co., 47 Ferry St., City, $20, as follows: F. A. M. Burrell, $3; James Brown, F. Stanley, J. Heidtrath, $1 each; J. Deadman, Wm. Tiger, Mr. M. Scully, Henry Bramm, H. Babcock, G. Bramm, F. Ball, E. Burrell, A. G. Menge, John A. Dram, T. S. Stine, T. O'Brien, each 50 cents; A. Stager, Henry Fetzer, L. Detmeiler, Wm. Fetzer, E. Anthony, L. Jacobs, Wm. Burns, George Miller, P. Callahan, Wm. McFarlane, J. McMahon, W. Sweet, J. O. Sullivan, Max von Kall, F. Foster, C. M. Drain, P. F. Hankin, Wm. Sester, I. Sunter, E. Hackett, T. McLaughlin, Pat. Cox, J. O'Neil, T. Haverty, J. Gallagher, J. McFarlane, M. Fennerty, P. Mooney, Wm. Tuite, J. Burns, F. Sculley, O. L. Menge, 25 cents each.

Pittsburgh Jottings.

To the Editor of The Electrical World:

SIR: The business of the Pittsburgh post-office has grown to such an extent that the old building, erected when the smoky city was little more than a village, is entirely inadequate for the purpose. Every nook and corner of it has been put to use, and now the electric light plant formerly in use in the Philadelphia post-office is to be brought here. It consists of 80 incandescent and 25 arc lights, and all hands feel delighted at the prospect of basking in such a glorious light, after being so long in the dark as to the march of improvement in that direction.

The manufacture of carbons by the use of natural gas is now being extensively and satisfactorily tested by the Pittsburgh Carbon Company. This company is now producing an excellent article by the use of this superior fuel, gaining a uniformity of carbonization that cannot be reached by any other known fuel, and also a considerable increase in durability, giving, it is claimed, much evener and purer light. D.

The Jenney Electric Lighting Patents.

To the Editor of The Electrical World:

SIR: Your Chicago correspondent's reference to the Jenney electric companies, under date of June 2, is likely to create a wrong impression. We have the exclusive patents for the Jenney system of electric lighting, except a half interest in a patent on lamps, which the inventor, Chas. D. Jenney, our electrician, allowed to be issued jointly to himself and his father, J. A. Jenney. This patent is valueless, no lamps having been made under it for a year or two. We have all of the patents and inventions for the Jenney system. The Fort Wayne company has no patents whatever on any part of it, nor any right to use the same. We had decided not to enjoin them for infringment, but let them demonstrate their inability to long compete under the old unmatured system. Possessed of everything of value that the Fort Wayne company is using (using unlawfully, even the name), supplemented by Mr. Jenney's recent appliances and inventions and his personal supervision, we have been content. But the electrical world in general should know that the Fort Wayne company's work is not the Jenney system of to-day.

JENNEY ELECTRIC COMPANY,
BRAINARD RORISON, Secretary.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, June 18, 1885.

The Electric Development and Manufacturing Company of this city, are now making all the apparatus for the Judkins Railway Train Signal Company. They are at present engaged in making one thousand sets of this apparatus for them. They are also making one thousand sets of apparatus for the Finger Electric Medical Apparatus Company. Turning out only the finest and most durable kind of electrical apparatus and appliances, this company is pushed to its utmost facilities to keep up with orders.

The Brush Company, whose consolidation with the Merchants' Company was consummated last week, has just completed a new station in this city, with five 150 H. P. engines of the Armington & Sims Company's make, and seven 100 H. P. steel tubular boilers set with the Jarvis furnace.

The Jarvis Engineering Company, 61 Oliver street, report an improvement in their business. They have sold recently the following Armington & Sims Company engines:

Brookline Electric Light Company, Boston, one 50 H. P.; Consolidated Electric Light Company, Portland, Me.; one 50 H. P.; Oak Island Electric Light Company, one 50 H. P.; Merrick Thread Company, Holyoke, Mass., one 150 H. P.; American Tool and Machine Company, Boston, one 35 H. P., low pressure engine; Doliver, Goodale & Company, Boston, one 60 H. P. engine; Howard, Bullough & Riley, Boston, one 50 H. P.; and to the Thomson-Houston Electric Light Company, two 50 H. P. engines for Peru.

The Merchants' Electric Light and Power Company of this city have ten 50 H. P. Armington & Sims Company engines and six 100 H. P. boilers set with the Jarvis patent furnace, burning screenings for fuel.

Business is very fair with Mr. Chas. L. Bly, manufacturer of and dealer in electrical goods and supplies, No. 37 Pearl street. He has just completed a contract for the Revere Beach Land Company, putting up wires, lamps, dynamos, etc., etc.; and has, together with the Remington Electric Light Company, finished one of the most attractive and artistic jobs of the kind. The Revere Beach Land Company are very enthusiastic in their favorable comments. Mr. Bly has made arrangements with the Orne Electric Battery Company to manufacture and sell their batteries and other apparatus.

Mr. Cyrus O. Baker, Jr., of the well-known house of Baker & Co., Newark, N. J., favored this office with a visit on Thursday, 18th inst. This firm stands very high among those engaged in electrical industries, and makes a very superior grade of platinum.

The Redding Electrical Company, 30 Hanover street, are manufacturing a most novel and useful electric striking gong. This gong is used for fire and burglar alarms, or for any other purposes where a loud sounding gong is required. It needs but little battery power to operate it, and will strike 450 blows at each winding. It can be used in connection with signal boxes to strike off signals, and may be used on open or closed circuit.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO, June 17, 1885.

The messenger boys have been indulging in the exciting but not very remunerative recreation of striking. First it was the Baltimore & Ohio boys, and thirty of them went out. The company took about half of them back, and the rest are looking for other pastures. Then the Western Union boys, to about the same number, organized a strike, and met with the same fate. Our sympathies are with the boys always, but they should bear in mind the fact that a strike is about as poor a method as can be adopted to obtain a redress of grievances.

Mr. Thos. D. Lockwood and Special Agent Boyd, of the American Bell Telephone Company, were in Chicago a few days ago.

The new city building is to be equipped with a complete telephone outfit, comprising fifteen sets of instruments, to provide for communication within the building between the heads of departments. The Western Electric Company does the work and the Chicago Telephone Company furnishes the telephones.

The Stanley lamp is being pushed here energetically

now, under Mr. C. D. Shain's management. Quite a number of these lamps were introduced last week in Lea's, the Bee Hive, Chas. Gonage & Co.'s and Grenier's west-side gardens. In each of these places arc lamps were already in use, and the incandescent current is taken from the arc machine. Rockford, Ill., is to have some of the lamps this week.

Wherever the larger size of Stanley incandescent lamp is introduced it attracts a good deal of attention, and these lamps, of say 150 candle-power, will probably be preferred in many cases to the arc. The Stanley company's Western agency is starting off very nicely, and the prospects for business are good.

The annual meeting of the stockholders of the Rocky Mountain Bell Telephone Company was held June 8, and the old officers were re-elected. The following comprise the board of directors: C. F. Annett, J. J. Dickey, Thomas Sherwin, C. Jay French, Geo. M. Scott, Geo. T. Wallace, C. W. Lyman, H. C. Hill, Chas. S. Smith.

Rowe & Page, patent lawyers, making a specialty of electrical cases, have opened an office at 85 Metropolitan Block, Chicago. Mr. Rowe has been in active practice before the Patent Office in Washington for some years; and Mr. Page, who is a son of Charles Grafton Page, of induction coil fame, was formerly one of the Patent Office examiners.

Mr. George M. Meyers, of Kansas City, general manager Pacific Mutual Telegraph Company, furnishes a few items of interest in regard to his company. The Pacific Mutual was organized about two years ago by several capitalists of Kansas City, whom Mr. Meyers interested in his project for building a line from Kansas City to St. Louis; but soon after this line was completed the directors desired to extend the line north from Kansas City to St. Joseph, passing through Leavenworth and Atchison. The company now operate eighteen stations in all. Mr. Meyers has given careful attention to rapid service, with so much success that it is generally conceded that their delivery system is all that could be desired. An effort is being made to build an extension from St. Joseph, Mo., to Omaha, Neb., though there are at present some legal matters in the way, the plant having been leased to the Bankers & Merchants' Company, and it is believed that a receiver will be appointed controlling the property in the State of Missouri.

Mr. E. L. Smith, representing Lytle & Co.'s time-clock system in Kansas City, has on exhibition several clocks which are open to the inspection of the public.

The Home Telegraph and Signal Company, operating the only public messenger system in Kansas City, have opened a branch office near the corner of Eleventh street, on Main. They employ at present thirty-five messengers, and are doing a rapidly-increasing business.

The Kansas City telephone operators are now wearing the Richards head telephones, a very sensible invention and certainly an agreeable change from the old heavy and bulky styles.

The St. Joseph Electric Light Company, under the superintendence of Mr. W. C. Stewart, an electrician of large experience in the early days of the telegraph and telephone, has from the start given a very steady light to its subscribers, and the result has been a steady increase of business. At Leavenworth, where the service has not been by any means as good, the plant is to be entirely renovated.

THE TELEGRAPH.

The New Commercial Cable.—The steamer "Faraday" had, on the 11th inst., completed the laying of the Commercial Cable section from Waterville, Ireland, to Weston-super-Mare, England.

Fire Service for Public Schools.—Three bids were opened this week in New York City for building telegraph lines, laying two cables in the Harlem River, and other appliances for throwing the three hundred public schools of the city into the circuit with Firemen's Hall. The lowest bid, $15,750, was by Pearce & Jones.

Time Telegraph Service.—The time telegraph service, introduced within the last few years in this country, is now rapidly increasing in scope, its merits and convenience being recognized more and more each day. An exhibition of the system operated by the Telegraphic Time Company, of New York, took place last Thursday evening, in Music Hall, at Orange, N. J.

Increase of Capital Stock.—A certificate of the increase of the capital stock of the Commercial Telegram Company from $1,000,000 to $2,000,000 was filed in the County Clerk's office June 11. The new stock is to be issued only for the purpose of paying the company's present indebtedness, the shares so issued to be estimated at a valuation of not less than $7.50 each.

The Postal Telegraph.—In the city court of Baltimore, on the 12th inst., Judge Phelps decided that F. W. Blackiston, appointed receiver of the Postal Telegraph and Cable Company, after F. P. Stephens had been appointed receiver, was not guilty of contempt of court in refusing to obey an injunction sued out by Stephens. The matter will come up in another form in the United States court.

Rewarding Honesty.—A gentleman entered the telegraph office in the Delavan House, Albany, on June 12, and wrote a dispatch upon a blank envelope which he took from his pocket. After the operator had sent the message, he discovered that the envelope contained four certified checks on a Boston bank, one for $5,000, two for $10,000 and the other for $25,000. They had been drawn to be used in the purchase of the Lebanon Springs Railroad. When the gentleman stopped in for an answer to the telegram he was asked if he had lost anything, and he for the first time discovered that the checks were gone. They were returned to him and he suitably rewarded the finder.

The Postal in Ohio.—A dispatch of June 12 from Cleveland, O., says: In the Common Pleas Court this morning Campbell C. Brown and Thomas Fleming, of New York, who were recently granted a judgment for $105,000 against the Postal Telegraph and Cable Company by the Supreme Court of New York, made application for a receiver to take charge of the company's lines in this State, which have been appraised at $80,000. After hearing the application Judge Barber appointed Albert M. Chandler and Henry Rosener, who are also the receivers in New York.

James L. Shaw, who recently dropped dead from apoplexy, was born at Doylestown, Pa., and early in life drifted into the business of telegraphy. In 1850 he was the contractor for building one of the first telegraph lines in the country from Washington to New Orleans. Subsequently he became connected with the old Southern, the Eastern, the National and the Marine and Inland companies. He was vice-president of the Pacific & Atlantic, president of the Continental, and recently severed his connection with the American Rapid Telegraph Company as superintendent. Mr. Shaw was a member of the Franklin Institute, and at his death was president of the Automatic Electric Current Protector and Manufacturing Company.

THE TELEPHONE.

A Good Investment.—The Bell Telephone Company has declared a quarterly dividend of $3 per share. Bell Telephone pays 6.3 per cent. on the stock at 190.

A Long-Distance Line.—A line of hard-drawn copper wire between Belfast and Augusta, Me., has been completed by the New England Telephone and Telegraph Company, and is working successfully. It is forty-five miles in extent. It is expected that a line between Boston and Portland, 110 miles long, will be completed in a few days.

Bullish Talk.—The financial column of the Boston *Herald*, of June 13, had the following: Bell telephone rose 1½ to 193 this morning. A correspondent writes that with the acceptance of the report against regulating the telephone business, the last vestige of legislation disappears from the Legislature, and the Bell Company has run the gauntlet of it all, and come out unscathed. The security (stock) would, therefore, seem to him more valuable to-day than it was six months ago, and all the more valuable because authority to increase the capital stock was denied by the Legislature. He figures out 18½ to 19 per cent. net earnings, and sees yet larger earnings ahead. That which surprises him is the low price at which the stock is selling, and he concludes that it has been depressed by those who have an interest to depress it. As it is earning $18 per year on every $100 capital, and paying $15 (including $3 extra dividend), he thinks it would be cheap at $250 per share. At $250 it would pay 6 per cent. on the basis of 15 per cent. dividends. At $200 it would pay the same on 12 per cent. dividends, the present rate not including extras. It is not impossible (some say it is probable) that 3 per cent. extras can be continued, which they doubtless can be, unless it is thought desirable to use a portion of the surplus in constructing long-distance lines. The company could undoubtedly build a great deal in that direction without increasing its capital at all. What it will do remains to be seen. The fact that no more adverse legislation will be attempted by this Legislature is the bull point of the hour on the stock. New England's net debt probably does not exceed $25,000 to-day, a mere trifle for so large a company. It was $28,000 March 1, and there have been reductions since. The company is doing well.

THE ELECTRIC LIGHT.

Haddenfield, N. J.—A small isolated plant of the Remington system is to be put in this week.

Dividend.—The Salem (Mass.) Electric Light Company has declared a semi-annual dividend of 3 per cent.

Increase of Plant.—The Cleveland Electric Light Co. have put in two additional dynamos and a third Westinghouse automatic engine.

Incandescent Substituted for Arc.—It is said that the Pennsylvania Electric Light and Power Company, Harrisburg, Pa., is substituting incandescent for arc lights.

Charleston, S. C.—It is said that, having failed to obtain a city contract, and the orders from private parties being small, the electric light company at Charleston, S. C., will cease operations. Better try again.

Lawn Tennis by Electric Light.—At a garden party in West Philadelphia on Thursday evening last, the 18th inst., a number of full-blooded Philadelphians played a game of lawn tennis under the electric light. They say the light was better than the game.

A Sagacious Gas Company.—The Jamestown Gas Co., of Jamestown, N. Y., are preparing to introduce incandescent lighting into the business portion of the city. The system to be adopted is now under advisement, and the whole matter, both as to electric installation and the steam power, is in the hands of their consulting engineers, Messrs. Westinghouse, Church, Kerr & Co., of New York.

The Electric Light in Camden.—The Camden, N. J., Heating and Lighting Company offer to illuminate that city with thirty electric lights for a year for $4,500. They claim that these lights will displace one hundred and thirty-five gas lamps, and their bid is therefore $900 cheaper than that of the Camden Gaslight Company. The electric lights are to be suspended over the centre of streets.

Middlesex Electric Light Company.—At the annual meeting of the Middlesex Electric Light Company in Portland, Me., on June 9, the treasurer, John H. McAlvin, of Lowell, presented his annual report, of which the following is an abstract: Money received from all sources, $43,407.66; money expended, $42,244.08; balance in treasury, May 31, $1,163.58. At that time there were 235 electric lights in use in Lowell, Mass., 60 on poles in the streets, and 175 in stores and public buildings. Whole number of shares of stock, 15,000, at a par value of $10 each; stock sold and issued, 13,106; stock in treasury unsold, 1,894. No dividend was declared during the year, and the money earned was expended to improve the plant. Three of the dynamos for producing electricity have been loaned to the Triple Thermic Motor Company, who are at their own expense in running the same for the benefit of the electric light company's customers.

Aspen, Col.—The Brush light has been introduced in the busy mining town of Aspen, Col., by the Aspen Electric Light Company, of which Mr. L. G. Collins is president and Mr. C. E. Mackey secretary and treasurer. Some idea of the difficulties to be encountered may be learned from the statement that the apparatus was two weeks in transit from Granite, the nearest railway station, forty miles away, and cost six cents per pound. The company have a new 65-light dynamo, and several lamps are in use on three and a half miles of wire. The plant was put in with the help of Mr. R. H. Sterling, the electrician of the Colorado Electric Company in Denver.

Fairmount Park, Philadelphia.—The Cosmopolitan Electric Light and Telephone Company is now laying conduits for electric lights in Fairmount Park, the apparatus to be kept in operation for one year without expense to the city. At the end of that time the lamps will be taken down unless the Park Commission desires their retention and pays for them. Twelve lamps will be erected, each of which will be attached to a post fifteen feet in height. Four lamps will illuminate the drive between the Green street entrance and the Lincoln Monument and four additional will be placed on the river walk fronting the boathouses, the remainder to be located along the drive leading from the monument to the Girard avenue bridge. The conduits to carry the wires will be at a depth of eighteen inches, oval in shape, and will probably be in working order before the end of the month.

MISCELLANEOUS NOTES.

Strange Story of Lightning.—One of the latest and most curious lightning freaks is said to have occurred to Mr. Demarest, near Paterson, N. J., recently. A heavy gold ring was missing from the little finger of his left hand after a lightning stroke which prostrated him. Search was made for the ring, and it was found standing upright in the mud at the place of the accident, having been made perfectly straight by the action of the electricity.

A New Company.—The Faraday Electric Company has been incorporated for the purpose of producing electricity and using it to illuminate streets and buildings, and for heating and power purposes. Its capital stock is $100,000, divided into 4,000 shares, and its incorporators and trustees are Sidney F. Shelbourne, Edward Barr, George L. Weed, G. Victor Powell, and Theodore F. Reed. Its manufacturing business is to be carried on in Jersey City.

A Big Electric Organ.—We described in 1883 the largest organ in the world, excepting one. It is played with the aid of electricity, and has been built by Mr. Hilborne L. Roosevelt for the Stewart Cathedral of the Incarnation at Garden City, Long Island. The organ is in four parts, widely separated. All the wires used in making the electric connections would, if stretched out in one continuous circuit, extend over a distance of 21 miles. The current is obtained from a dynamo. A recital given last week was eminently successful.

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Am. Cable, b 61¼; Am. District, b 23 a 25; B. & M., a 3; Postal stock, b ⅝, a ¾; Postal sixes, b 8¼; Western Union, b 62⅝, a 62¾.

Telephone.—Am. Bell, b 199, a 200; Erie, b 21½, a 22; Mexican, b 1⅛; New England, b 33, a 33½.

Bell stock now stands higher than it has done since the beginning of May.

Electric Light.—Edison, b 60.

BUSINESS NOTICES.

J. Ullrich & Co., 106 and 108 Liberty street, are offering an excellent stylographic pen, which can be recommended as very pleasant to write with, and reliable. A card in another part of the paper gives details.

Anti-Magnetic Shields for Watches.—These shields, made by Giles, Brother & Co., State and Washington streets, Chicago, are an efficient protection to the works of watches from magnetism, as many testimonials in their possession show. This firm also demagnetize watches that are already affected.

Growing Business.—The Electric Manufacturing Company, of Troy, N. Y., have issued a new and enlarged catalogue this month, giving full particulars in regard to the large line of standard electrical instruments now manufactured by them. The company deserve the success they have achieved, all their work being reliable and of admirable finish. A department has now been added at the Troy factory for fine experimental work.

Telegraph and Telephone Poles.—The attention of telegraph, telephone and electric light companies is drawn to the large stock of cedar and pine poles, 25 to 60 feet in length, kept on hand by Messrs. Brownlee & Co., of Detroit, Mich. The firm also manufacture cross-arms, pins and brackets, fence-posts and railway cross-ties, all goods being made from selected stock by improved machinery. They are prepared to quote prices on the above goods in car-loads, delivered at any railroad station in the United States or Canada.

Railway and Telegraph Supplies.—The old and widely-known firm of L. G. Tillotson & Co., 5 and 7 Dey street, this city, has been dissolved, and Gen. E. S. Greeley, so long prominently connected with the house, has purchased the entire interest and good will of his late partner, L. G. Tillotson. The name of the new firm will be E. S. Greeley & Co. All the factories, salesrooms and offices will be carried on as heretofore, and there is no doubt that the high reputation and prosperity so deservedly enjoyed through many years will continue to be merited. We understand that the business will still embrace the manufacture, importation of, and dealing in railway and telegraph supplies of every description.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED JUNE 2, 1885.

Combined Supporting Bracket for Underground Traction Railways and Electric Wire Conduits..... 318,951
Consists of truss work and girders supporting between the braces and uprights a conduit, or several conduits.

Electric Switch; Arthur J. Holt, Grand Rapids, Mich..... 318,987
Consists of a right angle lever, the shorter arm of which is formed into an insulated handle, and the longer arm into a flat copper bar, which is adapted to play in between contact-springs.

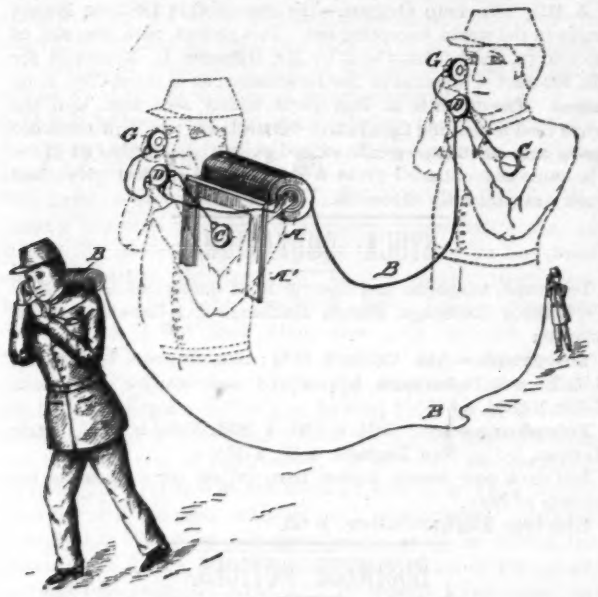
Unison Device for Printing Telegraphs; Lawrence A. McCarthy, Brooklyn, N. Y..... 319,001
In a two-wire printing telegraph instrument containing two type-wheels and an escapement-wheel on the same shaft rotated by mechanical means, escapement-magnets in one circuit actuating an escapement-lever and causing a step-by-step motion of the type-wheels, and in a second circuit polarized electro-magnets each actuating a printing-lever to print from one or the other type-wheel, according to the polarity of the current sent through this circuit, is placed, for the purpose of stopping the type-wheels at a certain point, a neutral magnet with a sliding core, which, when actuated by a current, presses into a notch in a disc fastened on the type-wheel shaft.

Railway Signal; Smith C. Pullman, Catskill, N. Y.. 319,023
Consists of an electric coupling for making electrical contact between cars. Two flat springs pressing upon each other in combination with a projection between them are included in the invention.

Rail for Electric Railways; Sylvanus F. Van Choate, New York, N. Y..... 319,041
As shown in the figure, a cap *K* is simultaneously a rail and a conductor, and is insulated from the supporting rail *i* by the insulator *j*.

Electric Telephone; Henry E. Waite, New York, N. Y..... 319,042
The electrodes are made of any suitable material, but preferably carbon having polished ends, and these are each secured to the inner ends of volute springs in any suitable manner.

Telephone Apparatus; Henry E. Waite, New York, N. Y..... 319,043
The reel *A*, containing the coil or roll of double wire to constitute the line *B*, may be of any desired construction that is adapted to be carried by the operator, that shown being provided with a frame *A'*, adapted to be secured to the back or shoulders. The inner terminal of the line-wire *B* is secured to the axis of the reel, and the ends of the double wire are each connected to a ring or strip *a a'*, of conducting material on the end of the spool or reel,



319,043. TELEPHONE APPARATUS.

which is made of insulating material or has the rings insulated therefrom. The spool or reel is hung in suitable arms A^2, upon which are secured two brushes a^2 a^3, arranged to bear upon the conducting-rings provided with binding-posts or other suitable connectors, to which the conductors leading to the telephone instruments are connected. The battery *C*, which is placed in the primary circuit of the transmitter, is made compact and portable, and is adapted to be carried in one of the pockets of the operator.

Electric Burglar Alarm; Joseph Barkheimer, Des Moines, Iowa..... 319,053
Consists in the construction and combination of circuit-closing devices with swinging doors and conducting-wires and an electric bell, in such a manner that the opening of the door will close a circuit and ring the bell, and also in such a manner that when a person removes a panel from a solid door or the woven-wire covering from a screen-door and attempts to pass through, the circuit will be closed and the bell rung to sound an alarm.

Underground Conductor for Wires; Burnet L. Nevius, Washington, D. C..... 319,112
It consists in a conduit, which is composed of a terra-cotta pipe of suitable length, and which is open along its top from one end to the other, so as to give free and easy access to the wires or cables within at all times, and which conduit is provided with outwardly-projecting flanges and shoulders, between which the earth catches, so that in case the pavement or conduit is moved by heaving of the frost, both the conduit and the pavement will move together, and thus always retain a uniform surface.

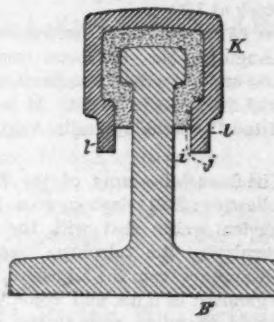
Incandescent Electric Lamps; Emile L. Roussy, Vevay, Switzerland..... 319,129
Consists of a lamp-holder for incandescent electric lamps made of insulating material and having a cavity to receive a column of finely-divided carbon. This cavity is closed by a clip-plate, to which one of the electric conductors is connected, and a metal screw passes through the clip plate and presses upon the column of carbon, and there is a metal screw or plug to close the inner end of the cavity containing the carbon. A key of usual construction is provided for opening and closing the lamp-circuit.

Holder for Incandescent Electric Lamps; Alexander Bernstein, Boston, Mass., Assignor to the Bernstein Electric Light Co., Portland, Me..... 319,177
Consists in the combination of two metallic sockets fixed on opposite sides of a suitably-supported vertical plate of an infusible insulating material, and each connected with one of the conducting-wires, and two metallic pins fixed in the base of the lamp insulated from one another, and each connected with one of the terminals of the carbon loop, the said pins being each provided with a contraction near its extremity, and the sockets each having in a recess in its side a horizontal sliding pin, which is forced back by the insertion of the vertical pin into its socket, but when the said pin is further inserted is forced by a spring into the contraction or neck, thus firmly holding the pin in position, and at the same time, by pressing it against the wall of the socket, establishing a perfect electrical connection.

Conduit for Electrical Conductors; William Cohlman, Philadelphia, Pa..... 319,197
The plates or bridges supporting the wires are pivoted.

Telegraph Sounder; John W. Delmege, North Billerica, Mass..... 319,210
Consists in the combination, with a pair of electro-magnets and a metallic sounding-frame having at its upper and lower ends screws or anvils, of a sounding post or bar carrying the armature of the electro-magnets and sliding in guides or bearings in the said sounding-frame, and operated longitudinally in one direction by the said magnets, and in the opposite direction by a spring, whereby its upper and lower ends are alternately brought into contact with the upper and lower anvils to produce the signals.

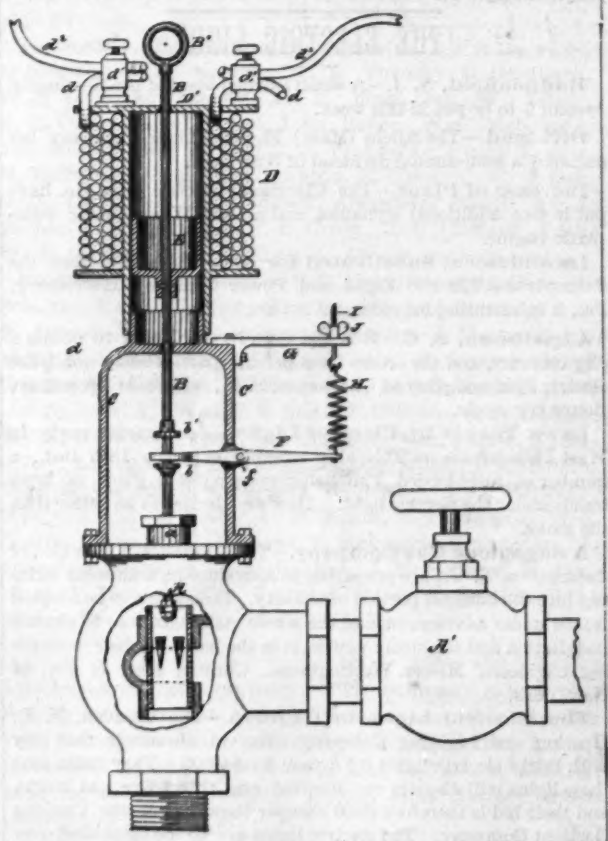
Automatic Instructor; Waldo L. Gates, Bayonne, New Jersey..... 319,224
It will speak clearly to indicate the correct answer without requiring any effort of the operator. It may serve as a game at



319,041. RAIL FOR ELECTRIC RAILWAYS.

which a number may play, making rules to determine how many trials each may make to hit the correct answer. The device will serve successfully without either the questioner or answerer previously possessing the information called for. One person, the questioner, but not necessarily well informed, applies a socket-piece connected by one of the flexible wires to the helix of the electric bell, and through it to one of the poles of the battery. He applies the socket-piece upon the question-pin connected with the question which he wishes to ask. Another person, the answerer, who may be either more or less informed than the other, holds a socket-piece connected by a flexible wire to the opposite pole of the battery. With it he covers or matches the answer pin on the board, which is associated with, adjacent to, or surrounded by the answer which he elects to give. Whenever he matches the right pin, the bell strikes, because the circuit is completed through a wire across the back of the board between that pin and the pin adjacent to the question. Whenever he touches a wrong one he produces no result, because there is no electrical connection. The general features are seen in the cut.

Secondary Electric Clock; Charles A. Hussey, New York, N. Y..... 319,259
Consists of the combination, with a toothed wheel, of an electro-magnet, a lever actuated thereby having a curved extension extending around a portion of said wheel and provided with a tooth, a resilient push-pawl secured to the lever and extending in a reverse direction to the curved extension around a portion of the wheel and impinging against one of the teeth on said wheel, and a spring for vibrating said lever in one direction.



319,260. GOVERNOR FOR STEAM AND FLUID ENGINES.

Governor for Steam and Fluid Engines; A. L. Ide, Springfield, Ill..... 319,260
The valve shown in the cut contains the special feature of being adapted to close by an extreme movement in either direction. It consists of an open ended cylinder provided with openings through its sides in its middle portion, and seated with two cylindric seats embracing its opposite ends, said seats being cast in the same piece, but separated by a passage by which the steam is admitted around the central portion of the movable valve between the seats, so as to enter the ports above described, and find escape at opposite ends of the valve. The valve and its seats are inclosed within a globe-shell in the usual manner of this general class of valves. The valve described can be operated to partially close off the steam from the engine by a movement in either direction, and will be perfectly closed when the central ports are brought wholly within either the upper or the lower cylindric seats. The cylinder is of course constructed of such length that when the central ports are brought into either seat so as to close them the other end at the same time protrudes into the opposite seat and cuts off the supply of steam.

Lightning Arresters for Iron Fences; William A. Morton, Abilene, Kansas..... 319,300
A wire connects one or more wires of the fence and terminates in the ground.

Electric Bell; Ernest F. Recordon, Geneva, Switzerland..... 319,318
Consists of base plate, support for bell, electro-magnet, etc., all cast in one piece.

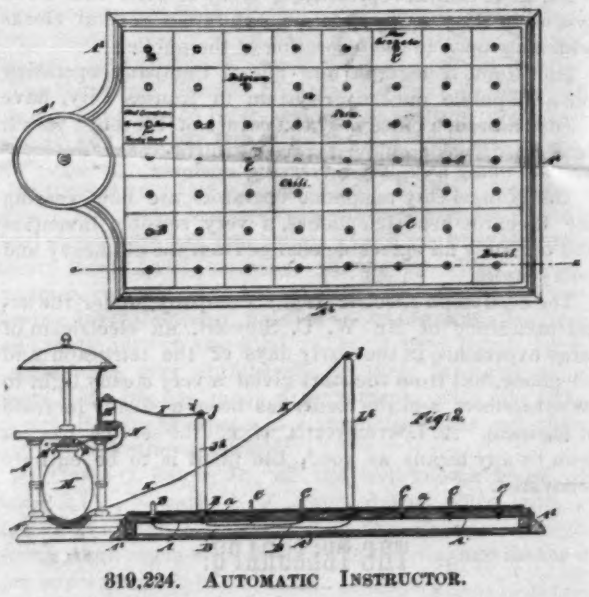
Electrical Conductor; William H. Sawyer, Providence, R. I..... 319,326
Employs the principle of a telescopic joint, and consists of the combination, with the two endwise adjacent metallic circuit-conductors, each comprising two concentric braided conducting members insulated from each other, of the two braided-wire coupling-sleeves connecting corresponding conductors, and suitable insulation between said sleeves.

System of Electric Lighting; William M. Thomas, Grand Rapids, Mich., assignor of one-half to the Grand Rapids Electric Light and Power Co. of same place... 319,347
Consists of the combination of an electric generator or source of electric energy, an electric circuit, suitably equipped arc lights placed in series in said circuit, incandescent lamps also placed in said circuit in series with the arc lights, and an automatic cut-out for each incandescent lamp which short-circuits the carbon or incandescent substance when it is ruptured.

Process of Carbonizing Paper; Stinson E. Trott, Wilmington, Ill..... 319,353
He rolls the paper between rollers, which are heated to a high temperature by means of a direct flame.

Electrical Lighting Apparatus; Ernest Arnould, Paris, France..... 319,380
Consists in mounting the poles—usually zinc and carbon—separately in the pile receptacle, so that the zinc pole may be adjusted and replaced without disturbing the other parts.

Safety Catch Plug for Electric Circuits; Sigmund Bergmann, New York, N. Y..... 319,384
Consists of a hollow safety-catch plug formed of non-com



319,224. AUTOMATIC INSTRUCTOR.

bustible insulating material and carrying a fusible safety-catch within it.

Electric Telephone Transmitter; Edward H. Johnson, New York, N. Y..... 319,415
Consists in employing in a transmitter a compound electrode—that is, one consisting of a number of points massed together but insulated from each other, and each extended to such a length as to be of considerable resistance, these extended contacts forming multiple-arc circuits which are opened and closed by the movements of the diaphragm. This compound electrode is placed in contact with an electrode attached to the diaphragm, and as such diaphragm is vibrated by the sound-waves of the human voice the electrode attached to it makes contact with a greater or less number of the points of the compound electrode.

Conduit for Underground Wires and Cables; Burnet L. Nevius, Washington, D. C..... 319,420
Consists in, first, the combination of a section of the large pipe provided with recesses in opposite sides, with a metallic cover, the board which is applied to its under side, a turning-bolt, which passes down through both cover and board, and a locking-lever, which is connected to the lower end of the bolt and adapted to catch in the recesses inside of the section; second, the combination of a section of the largest size of pipes with a box which is open at both top and bottom and provided with suitable openings in opposite sides, and which box is placed in between the sections of the curbstone; third, the combination of the sections of the conduit, a box which is placed between the sections of the curbstone, the cover which is placed over the top of the box, and the slide which is placed inside of the box.

Quadruplex Telegraph; Gerritt Smith, Astoria, N. Y..... 319,428
A condenser is employed whose opposite poles are respectively connected to the main and artificial lines at points between the junction of said lines and the receiving-instruments, and in case of a simple duplex the two poles of a condenser are connected, one to the main line at the receiving end, between the earth and the receiving-instruments, and the other directly to earth. A condenser as thus described may be advantageously used, though it is preferable to include in said condenser branch or circuit an electro-magnetic coil, which is so wound upon the core of the neutral relay as to cause the currents established by the charge and discharge of the condenser to act so as to hold the armature of said neutral relay to its core when it would otherwise be left free to the action of its retracting-spring and would be withdrawn to back contact.